federal register

TUESDAY, MAY 16, 1978
PART IV

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

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COMMERCIAL TANNER CRAB FISHERY OFF COAST OF ALASKA

Fishery Management Plan and Proposed Regulations

[3510-22]

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

[50 CFR Parts 611, 671]

COMMERCIAL TANNER CRAB FISHERY OFF THE COAST OF ALASKA

Fishery Management Plan and Proposed Regulations

AGENCY: National Oceanic and Atmospheric Administration, Commerce.

ACTION: Fishery management plan and proposed regulations.

SUMMARY: This document proposes regulations to govern domestic and foreign fishing for Tanner crab off the coast of Alaska. These regulations are proposed to implement the Fishery Management Plan for Tanner Crab Off Alaska which was adopted by the North Pacific Fishery Management Council, and approved by the Secretary on April 18, 1978, under the Fishery Conservation and Management Act of 1976. This document also contains the "Fishery Management Plan for Tanner Crab off the Coast of Alaska". Comments are solicited on the plan as well as the proposed regulations.

DATE: Comments will be received until June 30, 1978.

ADDRESS: Comments should be addressed to: Assistant Administrator for Fisheries, National Oceanic and Atmospheric Administration, 3300 Whitehaven Street NW., Washington, D.C. 20235.

FOR FURTHER INFORMATION CONTACT:

Mr. Harry L. Reitze, Director, Alaska Region, National Marine Fisheries Service, Box 1668, Juneau, Alaska, 99802, 907-586-7221.

SUPPLEMENTARY INFORMATION:

BACKGROUND

The Fishery Conservation and Management Act of 1976 as amended, 16 U.S.C. 1801-1882 (the "Act"), authorizes the Secretary of Commerce (the "Secretary") to promulgate regulations implementing fishery management plans prepared by the Regional Fishery Management Councils for their areas of jurisdiction within the 3-200 mile Fishery Conservation Zone (FCZ) established by the Act.

Pursuant the Title III of the Act, the North Pacific Fishery Management Council adopted and submitted to the Secretary a Fishery Management Plan (FMP) for Tanner crab off the coast of Alaska. A Draft Environmental Impact Statement (DEIS) for the plan was published on July 11, 1977 by the National Marine Fisheries Service. For notice of availability of the DEIS, see 43 FR 37026. The FMP and implementing regulations in combination, are published herein.

This FMP supersedes that portion of the Preliminary Management Plan (PMP) for king and Tanner crab of the eastern Bering Sea applicable to Tanner crab (42 FR 9520, February 16, 1977). It covers all Tanner crab throughout the Fishery Conservation Zone (FCZ) adjacent to Alaska.

PURPOSE OF THE PLAN

Three major objectives control the philosophy of management of the Tanner crab fishery off Alaska:

1. Minimize fluctuations in stock abundance due to harvest by maintaining the full reproductive potential of the Tanner crab stocks;

2. Insofar as possible, prevent industry overcapitalization and minimize economic distress due to extreme fluctuations in harvest based on naturally fluctuating stock abundance; and

3. Integrate management of Tanner crab stocks with those of other fisheries to maximize economic returns and minimize adverse impact on other stocks.

REGULATIONS TO IMPLEMENT THE PLAN

Accordingly, the regulations (50 CFR Part 671) set forth immediately below, applicable to all domestic fishers, are proposed to implement the fishery management plan developed by the North Pacific Fishery Management Council published herein. Final regulations for foreign fishers of Tanner crab have already been published (March 14, 1978, 43 FR 10566-10567) to implement the preliminary fishery management plan, and these regulations continue in effect. The Service proposes to implement the present FMP for Tanner crabs with these identical regulations (Part 611, Subpart G) which are reprinted herein and upon which public comment is solicited.

An important element of the FMP is the flexibility built into the management system. This flexibility is in the form of in-season adjustments of those areas which may be fished and the times in which fishing may occur. These proposed regulations seek to provide for such flexibility by proposing that the Alaska Regional Director of the National Marine Fisheries Service, in close coordination with the Alaska Department of Fish and Game, adjust season opening and closing dates, based upon catch statistics and biological and other data, for conservation purposes. In-season adjustments will be accomplished by issuance of a field order by the Regional Director.

PUBLIC COMMENT

Interested parties, Councils and government agencies are encouraged to submit written comments, views or data concerning the plan and these proposed regulations, including the foreign fishing regulations appearing on March 14, 1978, (See 50 CFR 611, 34 FR 10566—10567) to the Assistant Administrator for Fisheries, National Oceanic and Atmospheric Administration, 3300 Whitehaven Street NW., Washington, D.C. 20235. Written comments may be submitted to the Assistant Administrator until June 19, 1978.

NOTE.—The appropriate amended environmental impact statement has been filed with the Environmental Protection Agency. The National Marine Fisheries Service has determined that this document does not contain a major proposal requiring preparation of an economic impact statement under Executive Orders 11821 and 11949, and OMB Circular A-107.

Signed at Washington, D.C., this 3d day of May 1978.

WINFRED H. MEIBOHM,
Associate Director,
National Marine Fisheries Service.

50 CFR Part 611 is amended as follows:

§ 611.20 [Amended]

1. In § 611.20 Table I, the second and third entries from the bottom are deleted and the following entries are inserted: 017 and 018 * * * Tanner crab * * * Bering Sea * * * 15,000 * * * DO 099 * * * Other species * * * Aleutians and Bering Sea * * * 93,600 * * * DO.

2. Section 611.91 is added to read as follows:

§ 611.91 Tanner crab fishery.

(a) *Purpose.* This section regulates foreign fishing for snow (Tanner) crabs (*Chionoecetes bairdi* and *Chionoecetes opilio*) in the Bering Sea.

(b) *Authorized fishery.* (1) *TALFF.* The 1978 TALFF for snow (Tanner) crab is 15,000 metric tons. (2) *National allocations.* Foreign vessels may engage in the fishery for snow (Tanner) crab in accordance with TALFF set forth in paragraph (b)(1) of this section and the following national allocations:

(i) Japan: 15,000 metric tons.

(c) *General restrictions.* No foreign fishing vessel may retain any female or soft shell snow (Tanner) crab. All female or soft shell crabs shall be immediately returned to the sea in a manner which minimizes handling mortality, and in accordance with § 611.13.

(d) *Gear restrictions.* It shall be unlawful for a foreign fishing vessel fishing for snow (Tanner) crab to use gear other than pots. A pot is defined as a portable structure designed and constructed to capture and retain crabs alive in the water.

(e) *Open area.* Foreign fishing vessels may fish for snow (Tanner) crab in the Bering Sea, except as restricted in § 611.91(f).

(f) *Closed area.* No foreign fishing vessel may fish for snow (Tanner) crab:

(1) Within 12 nautical miles of the baseline used to measure the U.S. territorial sea; or (2) south of a straight line drawn along 58° N. latitude, and east of a straight line drawn along 164° W. longitude.

(g) *processing.* No foreign fishing vessel operating with a factory ship may process crabs. (The permits for such vessels will specifically exclude from the authorized activities the processing of crabs.) All crabs taken by such vessels must be processed solely by a factory ship permitted in the crab fishery.

(h) *Loading and off-loading.* Crabs must be taken aboard factory ships in a manner in which an observer can verify the total weight of crabs taken aboard. Crabs off-loaded within the fishery conservation zone from fishing vessels not operating with a factory ship must be transferred in a manner in which an observer can verify the total weight of crabs off-loaded.

(i) *Pre-departure inspection.* No foreign crab catching vessels, other than those operating with a factory ship, may depart from the fishing area until its catch of crabs onboard is checked by an observer, or an authorized officer.

(j) *Additional reports.* (1) *Daily reports:* Foreign crab catching vessels, other than those operating with a factory ship, shall report daily to the Regional Director:

(i) Its 12 noon (G.m.t.) position,

(ii) The preceding day's catch by species (*C. bairdi, C. opilio,* and hybrids), and

(iii) Its cumulative catch.

(2) *Weekly catch report.* (i) The weekly catch report (required by Section 611.9(e) shall be submitted to the Regional Director within 6 days following each 7-day fishing period, and contain additional information concerning:

(A) Effort in total pot lifts during the 7-day period, and

(B) Catch in metric tons and the number of crabs of the type *C. opilio* and *C. bairdi* caught during the 7-day period. Hybrids shall be reported as *C. opilio.*

(ii) The requirement of § 611.9(e)(1) that the weekly catch report be on a vessel-by-vessel basis is waived for vessels operating with a factory ship. The required data for such vessels may be consolidated and reported by factory ship.

(3) *Annual report.* Each nation whose vessels engage in this fishery shall report by May 30, of the following year annual catch and effort statistics as follows: Effort in pots hauled and hours pots soaked; catch in metric tons, and the number of snow (Tanner) crabs of the species *C. opilio, C. bairdi,* and hybrid. Each of these requirements is to be supplied by vessel class, by month by ½° (lat.) by 1° (long.) statistical area by the following species grouping: *C. bairdi, C. opilio.*

50 CFR Part 671 is added as follows:

PART 671—TANNER CRAB OFF ALASKA

Sec.

671.1 Purpose.
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AUTHORITY: Sec. 305, Fishery Conservation and Management Act of 1976; 16 U.S.C. 1855.

§ 671.1 Purpose.

This part regulates fishing for Tanner crab (*C. bairdi* and *C. opilio*) by vessels of the United States within that portion of the Bering Sea and Gulf of Alaska over which the United States exercises exclusive fishery management authority.

§ 671.2 Definitions.

As used in this Part:

(a) *"Act"* means the Fishery Conservation and Management Act of 1976, 16 U.S.C. 1801–1882.

(b) *ADF & G* means the Alaska Department of Fish and Game.

(c) *Authorized Officer* means:

(1) Any commissioned, warrant, or petty officer of the Coast Guard;

(2) Any certified enforcement or special agent of the National Marine Fisheries Service;

(3) Any officer designated by the head of any Federal or State agency which has entered into an agreement with the Secretary or the Commandant of the Coast Guard to enforce the provisions of the Act; or

(4) Any Coast Guard personnel accompanying and acting under the direction of any person described in subparagraph (1) of this paragraph.

(d) *Vessel* means any vessel, boat, ship, or other craft which is used for, equipped to be used for, or of a type which is normally used for fishing for Tanner crab for the purpose of sale or barter.

(e) *Fishery conservation zone (FCZ)* means that area adjacent to the United States which, except where modified to accommodate international boundaries, encompasses all waters from the seaward boundary of each of the coastal States to a line on which each point is 200 nautical miles from the baseline from which the territorial sea of the United States is measured.

(f) *Fishing* means any activity, other than scientific research, which:

(1) Does, is intended to, or can reasonably be expected to result in the removal from the sea of Tanner crab.

(2) Results in the processing including freezing of Tanner crab or Tanner crab products at sea; or

(3) Results in the transfering or transporting at sea of Tanner crab or Tanner crab products.

(g) *Person* means any individual, corporation, partnership, association, or other entity.

(h) *Regional Director* means the Director of the Alaska Region of the National Marine Fisheries Service, or his designee.

(i) *Ring Net* means a bag-shaped net suspended from a circular or rectangular frame.

(j) *Tanner Crab* means all species of the genus *Chionoecetes* including *C. bairdi* and *C. opilio.*

(k) *Tanner Crab Pot* means a portable structure designed and constructed to capture and retain fish and shellfish alive in the water. The Tanner crab pot has rigid tunnel eye openings which individually are a maximum of five (5) inches (13 cm) in one dimension, and tunnel eye opening perimeters which individually are larger than thirty (30) inches (76 cm); or the pot tapers inward from its base to a top consisting of one horizontal opening of undescribed size.

§ 671.3 Registration areas.

(a) For purposes of this part the FCZ off the coast of Alaska is divided into four Federal registration areas identified and described as follows:

(1) *Registration Area A* (Southeastern Alaska-Yakutat) is that portion of the FCZ north of 54°30′ N. latitude and east of 143°53.6′ W. longitude;

(2) *Registration Area E* (Prince William Sound) is that portion of the FCZ which has as its western boundary a line extending south from Cape Fairfield (150° W. longitude), and as its eastern boundary a line extending south from Cape Suckling (143°53.6′ W. longitude);

(3) *Registration Area H* (Cook Inlet) is that portion of the FCZ which has as its eastern boundary a line extending south from Cape Fairfield (150° W. longitude), and as its southern boundary a line extending east from Cape Douglas at 58°51′ N. latitude;

(4) *Registration Area J* (Westward) is that portion of the FCZ which has as its northern boundary a line at 58° N. latitude, as its eastern boundary a line extending south from Cape Fairfield 150° W. longitude, and as its western boundary a line 172° E. longitude.

(5) The inner boundary of each Federal registration area is a line coterminous with the seaward boundary of

the State, and the outer boundary, except for Registration Area H (Cook Inlet), is a line drawn in such a manner that each point on it is 200 nautical miles from the baseline from which the territorial sea is measured. The outer boundary for Registration Area H (Cook Inlet), is a line extending east from Cape Douglas at 58°51' N. latitude.

(b) *Exclusive and Non-Exclusive Areas.* Federal Registration Areas E and H, as defined in subsection (a) are exclusive Registration Areas. Federal Registration Areas A and J, as defined in subsection (a) are non-exclusive registration areas.

(c) *State Registration Areas.* For purposes of this part there shall be four State registration areas which shall be designated A, E, H, and J to correspond to the Federal registration areas. The State areas adjoin the corresponding Federal areas at the common boundary which separates territorial waters from the FCZ.

§ 671.4 Optimum yield table.

(a) The optimum yield for Tanner crab in each Federal registration area is as follows:

Registration area	Optimum yield (in metric tons)	Species
Registration Area A (Southeast–Yakutat).	2,495	*C. bairdi*
Registration Area E (Prince William Sound).	1,361–3,175	*C. bairdi*
Registration Area H (Cook Inlet).	2,404	*C. bairdi*
Registration Area J, Kodiak district only (Kodiak).	6,804–11,340	*C. bairdi*
Subdistricts of Area J:		
(1) Area between 157°27' W. longitude (Cape Kumlik) and 172° E. longitude, south of the South Peninsula and Aleutian Islands:		
(South Peninsula)	9,072–13,608	*C. bairdi*
(Aleutian)	907	*C. bairdi*
(2) Bering Sea waters north of 54°36' N. latitude.	40,381	*C. bairdi*
(3) Bering Sea waters south of 58° N. latitude.	10,000	*C. opilio*
(4) Bering Sea waters north of 58° N. latitude and west of 164° W. longitude.	1,360–2,269	*C. opilio*

§ 671.5 Prohibitions.

(a) *Vessel registration certificate.* No vessel shall fish for Tanner crab in any Federal registration area unless authorized by a registration certificate issued pursuant to § 671.6.

(b) *Vessel inspection.* No vessel shall fish for Tanner crab unless it is inspected as required by § 671.8.

(c) *Landings.* No Tanner crab shall be landed except pursuant to § 671.9.

(d) *Retention of Tanner crab.* No Tanner crab shall be retained except pursuant to § 671.6.

(e) *Gear.* Tanner crab may be taken only by Tanner crab pot or ring nets, except as otherwise provided in § 671.10 of these regulations.

(f) *Seasons.* Tanner crab may be taking only during the seasons provided in § 671.10.

(g) No person shall possess, have custody or control of, ship, transport, offer for sale, sell, purchase, import, export, or land, any Tanner crab taken in violation of the Act and these regulations.

(h) No person shall fish for Tanner crab in violation of the Act and these regulations.

(i) No person shall fish for Tanner crab or possess unprocessed Tanner crab aboard a vessel within any registration area unless the vessel is validly registered for the area and the season is open, or unless the person is acting pursuant to the authorization of § 671.9(b) of these regulations.

§ 671.6 Size and sex restrictions.

(a) No female Tanner crab may be retained.

(b) No male Tanner crab measuring less than 5½ inches (140 mm) across the greatest width of the carapace may be retained, except that male Tanner crabs in Federal Registration Area E (Prince William Sound) may be retained if they measure 5.3 inches (135 mm) across the greatest width of the carapace. The width measurement of Tanner crab shall be determined by measuring the greatest straight line distance across the carapace, including the spines, perpendicular to an imaginary line drawn between a point midway between the eyes and the midpoint of the posterior portion of the carapace.

(c) All female and undersized male Tanner crabs must be returned to the sea immediately with a minimum of injury, regardless of their condition.

§ 671.7 Vessel registration.

(a) *Vessels not registered by the State.* This subsection provides procedures for the registration of vessels which are not registered by the State to fish for Tanner crab as provided in subsection (b).

(1) *Application.* The owner, or the owner's authorized agent, of any vessel may apply to the Regional Director for a registration certificate to fish for Tanner crab in a Federal registration area. All applications shall be submitted on a form obtained from the Regional Director.

(2) *Time.* Application forms must be completed by the applicant and received by the Regional Director within 30 calendar days prior to the scheduled date for the opening of fishing as provided for in § 671.10.

(3) *Approval.* The Regional Director shall issue the registration certificate to the vessel if he determines that the requirements of paragraphs (1) and (2) of this section are met.

(4) *Waiver.* If an application is received after the date specified in paragraph (2) of this section the Regional Director may, for good cause shown, waive the 30 day time requirement.

(5) *Certificates.* The registration certificate issued to the vessel shall be signed by the registrant, kept on board the vessel at all times during fishing operations, and presented to any authorized officer upon request.

(6) *Inspection.* A registration certificate shall not become valid until the vessel has complied with the inspection requirements contained in section 671.8 of these regulations.

(7) *Fees.* There shall be no fee for the issuance of a registration certificate.

(8) *Expiration.* A registration certificate shall expire 72 hours after the closure of the season in the Federal registration area for which it was issued.

(b) *Vessel registered by the State of Alaska.* (1) Vessels registered by the State to fish for Tanner crab in a State registration area may only register for the corresponding adjacent Federal registration area of the same letter. Such registration can be accomplished by obtaining at the time the vessel is registered by the State a stamp issued by a local representative of the ADF&G designated by the Regional Director for such purpose. The stamp shall indicate registration for the corresponding adjacent Federal registration area of the same letter.

(2) Vessels registered by the State to fish for Tanner crab in an exclusive State registration area may only register in the corresponding Federal exclusive registration area of the same letter.

(c) *Exclusive and nonexclusive areas.* (1) No vessel registered to fish for Tanner crab in an exclusive Federal registration area may be registered to fish for Tanner crab in any other Federal registration area (exclusive or nonexclusive). A vessel may be registered to fish for Tanner crab in either or both of the non-exclusive Federal registration areas.

(2) No operator of a vessel registered for an exclusive Federal registration area may operate any other vessel registered for any other exclusive Federal registration area.

§ 671.8 Vessel inspection.

(a) *Inspection requirement.*—(1) *Time.* Within 72 hours prior to a season opening or at any time during the open season prior to fishing, each registered vessel must have its holds or live tanks inspected by an authorized officer, at inspection points specified in subsection (b) of this section.

(2) *Requirement.* No Tanner crab shall be onboard the vessel at the time of inspection. This requirement must be met to validate the registration certificate for the Federal registration area concerned under section 671.7.

(3) *Certificate.* No vessel shall be given an inspection certificate unless a current registration certificate for the Federal registration area is displayed to the authorized officer conducting the inspection. The inspection certificate shall be signed by the current vessel operator and shall be presented to any authorized officer upon request at any time.

(4) *Landings.* A vessel landing Tanner crab pursuant to § 671.9(b) of these regulations, in a State registration area other than the area adjacent to the Federal registration area for which the vessel is registered, shall attach the inspection certificate to the back of the ADF&G copy (yellow copy) of the State fish ticket at the time the Tanner crab are landed.

(b) *Inspection Points.* Inspection points shall be those established by ADF&G for State purposes. Additional inspection points for inspection required by this section may be authorized by the Regional Director if he finds that:

(1) Existing inspection points are imposing an unusual and material hardship which affected fishermen cannot themselves mitigate; or

(2) The ADF&G has no practical means of making special administrative accommodations regarding existing inspection points; and

(3) Authorization of additional inspection points would not result in a significant likelihood of unauthorized fishing or other management or enforcement problems.

§ 671.9 Landing requirements.

(a) Except as provided in subsection (b) of this section, all Tanner crab landed in the State must be landed in the corresponding State registration area adjacent to the Federal registration area of the same letter for which the vessel is registered.

(b) A vessel operator who desires to land Tanner crab outside the State, or in a State registration area other than the adjacent corresponding State registration area of the same letter, shall contact by radio or other means an authorized officer prior to leaving the Federal registration area for which the vessel is registered, and shall state to the authorized officer the amount of Tanner crab on board at the time. A vessel acting pursuant to this authorization shall submit to inspection at such location as the authorized officer may require and land no greater amount of Tanner crab than were present at the time of any inspection.

(c) When a vessel lands Tanner crab pursuant to the authorization in subsection (b) of this section, the registration under which the vessel is operating becomes invalid. In order to again become registered for a Federal registration area, the vessel must comply with § 671.8.

§ 671.10 Season and gear restrictions.

(a) *Season dates.* All season dates are inclusive. Time periods begin at 12:01 a.m. and end at 11:30 p.m. of the dates specified, based on local zone time, unless otherwise specified in these regulations.

(b) *General requirements.* (1) At least one buoy on each Tanner crab pot or ring net shall be legibly marked with the permanent registration number of the vessel fishing gear. The buoy shall bear a single registration number and this number shall be that of the vessel used in operating the gear. Registration numbers shall be painted on the top one-third of the buoy in numerals at least 4 inches in height and ½ inch in width in contrasting color to that of the buoy. The buoy markings shall be legibly inscribed and visible on the buoy above the water surface when attached to the Tanner crab pot, and maintained in a legible condition.

(2) During the closed season for Tanner crab in any given area, Tanner crab pots shall either be removed from the water or stored in 25 fathoms (46 m) of water or less, with all doors secured fully open and all bait and bait containers removed, with the following exceptions:

(i) In the Kamishak Bay and Southern districts of the Cook Inlet area, the maximum pot storage depth is 15 fathoms (27 m);

(ii) Tanner crab pots with all doors secured fully open and with all bait containers removed may be stored in water depth greater than the maximum permissible storage depth for 72 hours prior to the opening of the Tanner crab season, and for 72 hours after the season closure where the pots are fished;

(iii) Tanner crab pots may be stored in waters deeper than 25 fathoms (46 m) if so provided in section 671.11 of these regulations.

(c) *Registration Area A.*—(1) *Seasons.* Tanner crab may be taken from September 1 through May 15, subject to adjustment by the Regional Director pursuant to sections 671.12 and 671.13 of these regulations.

(2) *Gear.* (i) South of the latitude of Cape Fairweather Tanner crab pots shall have a seam in the mesh of one vertical wall from top frame to bottom frame laced in with untreated cotton twine, or have one wall of synthetic fiber attached to the frame with untreated cotton twine.

(d) *Registration Area E.*—(1) *Districts.* The following districts within Federal Registration Area E are established:

(i) *Northern District:* All waters west and north of a line from the southern entrance of Port Nellie Juan at 60°36′ N. latitude to Point Eleanor to the eastern tip of Smith Island to Johnstone Point, and north of a line from Point Bentinck to Point Whitshed.

(ii) *Western District:* All waters east of the longitude of Cape Fairfield (148°53′ W. longitude) south of a line from the southern entrance of Port Nellie Juan at 60°35′ N. latitude to Point Eleanor to the eastern tip of Smith Island to Montague Point, west of a line from Zaikof Point to Seal Rocks (60°10′ N., 145°50′ W. longitude) and west of longitude of Seal Rocks (60°10′ N. latitude, 145°50′ W. longitude).

(iii) *Eastern district:* All waters east of longitude of Seal Rocks (60°10′ N. latitude, 146°50′ W. longitude), east of a line from Seal Rocks (60°10′ N. latitude, 146°50′ W. longitude), to Cape Hinchinbrook, south of a line from Point Bentinck to Point Whitshed, and west of the longitude of Cape Suckling (59°59′ N. latitude, 143°53′ W. longitude).

(iv) *Hinchinbrook district:* All waters east of a line from Montague Point to the eastern tip of Smith Island, south of a line from the eastern tip of Smith Island to Johnstone Point, north and east of a line from Cape Hinchinbrook to Seal Rocks (60°10′ N. latitude, 146°50′ W. longitude), and east of a line from Seal Rocks (60°10′ N. latitude, 146°50′ W. longitude) to Zaikof Point.

(2) *Seasons.* Tanner crab may be taken in Registration Area E from November 15 through May 31, subject to change by the Regional Director pursuant to section 671.12 and 671.13 of these regulations.

(3) *Gear.* Only Tanner crab pots may be used to fish for Tanner crab. Tanner crab taken by any other means must be immediately returned to the sea, with a minimum of injury, regardless of their condition.

(e) *Registration Area H.*—(1) *Districts:* The following districts within Registration Area H are established:

(i) *Central District;* Between a line extending from Boulder point at 60°46′23″ N. latitude, to Shell Platform C, then to a point on the west shore at 60°46′23″ N. latitude, and the latitude of Anchor Point light.

(ii) *Northern District:* All waters north of a line extending from Boulder Point at 60°46′23″ N. latitude, to Shell Platform C, then to a point on the west shore at 60°46′23″ N. latitude.

(iii) *Southern District:* All waters within a line from Anchor Point west to 59°46′15″ N. latitude, 152°20′ W. longitude, then south to 59°04′15″ N. latitude, 152°20′ W. longitude, then in a northeasterly direction to Cape Elizabeth, then from Cape Elizabeth to Point Adam, including Kachemak Bay.

(iv) *Kamishak Bay District:* All waters within a line from 59°46′15″ N. latitude, 153°00′30″ W. longitude, then east to 59°46′15″ N. latitude, 152°20′ W. longitude, then south 59°04′15″ N. latitude,152°10′ W. longitude, then southwesterly to Cape Douglas, including Kamishak Bay.

(v) *Barren Islands District:* All waters within a line from Cape Douglas to Cape Elizabeth, then south to 58°52′ N. latitude, 151°53′ W. longitude, then west to Cape Douglas.

(vi) *Outer District:* All waters within a line from Point Adam to Cape Elizabeth, then south to 58°52′ N. latitude, 151°53′ W. longitude, then east to the longitude of Aligo Point (149°44′33″ w. longitude), then north to the mainland of Alaska.

(vii) *Eastern District:* All waters east of the longitude of Aligo Point (149°44′33″ W. longitude), west of the longitude of Cape Fairfield (148°40′ W. longitude), and north of 58°52′ N. latitude

(2) *Seasons:* Tanner crab may be taken in Registration Area H from December 1 through April 30, except that the Kamishak Bay district will remain open through May 31, subject to adjustment by the Regional Director pursuant to sections 671.12 and 671.13 of these regulations.

(3) *Gear:* During any king crab season established by the State an aggregate of not more than 75 king and Tanner crab pots (including Tanner crab pots used in State waters) may be fished from any registered Tanner crab vessel.

(f) *Registration Area J.*—(1) *Districts.* The following districts within Registration Area J are established:

(i) *Kodiak district*: South of 53° N. latitude, west of 150° longitude and east of the longitude of Cape Kumlik (157°17.0′ W. longitude).

(ii) *South Peninsula District*: Between the longitude of Cape Kumlik and the longitude of Scotch Cap light (154°44.6′ W. longitude).

(iii) *Aleutian district*: Between the longitude of Scotch Cap light (164°44.6′ W. longitude and 172° E. longitude, and south of 54°36′ N. latitude.

(iv) *Bering Sea District*: Bering Sea waters north of 54°36′ N. latitude.

(A) The following subdistricts within the Bering Sea District are established:

(*1*) *Southeastern district*: East of 168° W. longitude, and south of the latitude of Cape Newenham (58°39′ N. latitude), including Bristol Bay waters.

(*2*) *Pribilof subdistrict*: West of 168° W. longitude and south of the latitude of Cape Newenham (58°39′ N. latitude).

(*3*) *Northern subdistrict*: North of the latitude of Cape Newenham (58°39′ N. latitude).

(*i*) *Nome section*: All waters of Norton Sound between the longitude of Penny River and the longitude of Topkok Head.

(*ii*) *General section*: All other waters of the Northern subdistrict.

(2) *Seasons.* Subject to adjustment by the Regional Director pursuant to sections 671.12 and 671.13 of these regulations, Tanner crab may be taken:

(i) In the Kodiak district from January 1 through April 30;

(ii) In the South Peninsula district from November 1 to 12 noon, May 15;

(iii) In the Aleutian district from November 1 to 12 noon, June 15;

(iv) In the Bering Sea district from November 1 to 12 noon, June 15.

(3) *Gear.*—(i) During any king crab season established by the State of Alaska in the Kodiak and South Peninsula districts an aggregate of not more than 75 king and Tanner crab pots (including Tanner crab pots used in State waters) may be fished from any registered Tanner crab vessel.

(ii) During the closed season for Tanner crab, Tanner crab pots may be stored west of 172° W. longitude in 30 fathoms (55 m) of water or less, or by removal from the water.

§ 671.11 Reporting requirements.

(a) The operator of any vessel subject to these regulations shall, for each sale or delivery of any Tanner crab caught within any Federal registration area, submit an accurately completed State fish ticket. The fish ticket shall be submitted to the Regional Director within 72 hours after such Tanner crab were sold or delivered.

(b) Each such fish ticket shall contain the following information:

(1) Type and quantity of fishing gear used;

(2) Catch by species in numbers of crab or weight thereof;

(3) Areas in which fishing was engaged in;

(4) Time of fishing; and

(5) Number of hauls.

§ 671.12 In-season adjustment of seasons and areas.

(a) The Regional Director may, following consultation with the A.D.F. & G., amend the season opening and closing dates specified in section 671.10 if he determines that an emergency exists. Such determination shall be based upon data which relates to the following factors:

(1) The effect of overall fishing effort within the registration area;

(2) Catch per unit of effort and rate of harvest;

(3) Relative abundance of Tanner crab within the area in comparison with pre-season predictions;

(4) The proportion of immature or soft shell Tanner crab being handled;

(5) General information on the condition of Tanner crab within the area;

(6) Information pertaining to the optimum yield within the Registration area; or

(7) Any other factors relevant to the conservation and management of the Tanner crab resource.

(b) If the Regional Director decides to close any area, or to open any area previously closed pursuant to the provisions of this section he shall issue a fielw order which includes the following information:

(1) The reason for the opening or closure;

(2) A description of the area to be opened or closed: and

(3) The effective date of such opening or closing.

§ 671.13 Notice requirements.

(a) No field order issued by the Regional Director pursuant to § 671.12 of these regulations shall be effective until:

(1) It has been posted for 48 hours, and otherwise made available to the public in accordance with procedures customarily used by the A.D.F. & G. for posting and publicizing similar notices of closure;

(2) It has been broadcast for 48 hours at those time intervals, channels and frequencies customarily used by the A.D.F. & G. to broadcast similar notices of closure; and

(3) A notice of such closure has been published in the FEDERAL REGISTER.

TANNER CRAB FISHERY OFF THE COAST OF ALASKA

FISHERY MANAGEMENT PLAN

AGENCY: National Oceanic and Atmospheric Administration/Commerce.

ACTION: Fishery Management Plan and Proposed Regulations.

EFFECTIVE DATE: May 9, 1978.

FOR FURTHER INFORMATION CONTACT:

Mr. Harry L. Rietze, Director, Alaska Region, National Marine Fisheries Service, P.O. Box 1668, Juneau, Alaska 99802, telephone 907-586-7221.

SUMMARY: A fishery management plan for the Tanner crab fishery off the coast of Alaska has been reviewed and approved in accordance with Section 304 of the Fishery Conservation and Management Act of 1976, 16 U.S.C. 1801 et seq., as amended (the Act). The plan was prepared and submitted by the North Pacific Fishery Management Council. This action has been taken under a delegation of authority from the Secretary of Commerce to the Assistant Administrator for Fisheries, National Oceanic and Atmospheric Administration. The plan has been found to be consistent with the national standards in Section 301 of the Act, the other provisions of the Act and other applicable law.

SUPPLEMENTARY INFORMATION: Proposed regulations to implement the plan are being published, concurrently with the publication of this plan, in the FEDERAL REGISTER. These proposed regulations will be open for public comment for a period of 45 days from the date of publication.

The commercial fishery for Tanner crab has only recently developed and is expanding rapidly, partly as a result of declining stocks of king crab and a subsequent shift in catch efforts to Tanner crab stock. There is much concern that without proper conservation and management measures, Tanner crab stocks will be overfished. The North Pacific Fishery Management Council, recog-

nizing the need for management of the Tanner crab fishery off Alaska, has developed a fishery management plan with three major objectives:

1. Minimize fluctuations in stock abundance due to harvest by maintaining the full reproductive potential of the Tanner crab stocks;
2. Insofar as possible, prevent industry overcapitalization and minimize economic distress due to extreme fluctuations in harvest based on naturally fluctuating stock abundance; and
3. Integrate management of Tanner crab stocks with those of other fisheries to maximize economic returns and minimize adverse impact on other stocks.

To achieve these objectives, the North Pacific Fishery Management Council has proposed that the Secretary of Commerce implement the fishery management plan through regulations providing for season, area, gear, sex, size, and harvest level restrictions for domestic fisheries, and through regulations governing foreign fishing which are identical to those published implementing the preliminary management plan for Tanner crab (see 50 CFR Part 611, 43 FR 10566-10567, March 14, 1978).

Signed at Washington, D.C., this 3d day of May, 1978.

Fishery Management Plan for Tanner Crab off the Coast of Alaska

PREPARED BY: NORTH PACIFIC FISHERY MANAGEMENT COUNCIL, P.O. BOX 3136DT, ANCHORAGE, ALASKA 99510, AND NATIONAL MARINE FISHERIES SERVICE, P.O. BOX 1669, JUNEAU, ALASKA 99802

May 1978.

Executive Summary of the Fishery Management Plan for Tanner Crab off Alaska

This plan represents the initial step in the development of a comprehensive management program for Tanner crab off Alaska in response to the requirements of the Fisheries Conservation and Management Act of 1976 (U.S. Pub. L. 94-265). The necessity for having a management plan in force by March 1978 that permits continuation of the fishery without disruption to the fishery industry mandates that the existing tested and familiar management measures and mechanisms be adopted.

The plan proposes that the Secretary adopt the relevant Alaska statutes and regulations currently in force. These statutes and regulations require registration, designate zones where fishing is permitted, establish limitation on sex and size of Tanner crab which may be retained, limit the type and amount of gear which may be employed, and employ other mechanisms to facilitate the administration and enforcement of the necessary and appropriate measures to manage Tanner crab.

This plan sets forth the measures necessary to conserve and manage Tanner crab resources as a unit throughout their range. It provides for a consideration of social and economic influences affecting the allocation of the resource confined only by conservation limits. The plan identifies mechanisms designed to minimize costs and unnecessary duplication and proposes enforcement aids. Together, these interrelated considerations constitute a system of Tanner crab management, consistent with the National Standards set forth in the Fisheries Conservation and Management Act of 1976.

I.A. CONSERVATION AND MANAGEMENT MEASURES

The measures necessary to achieve the optimal yield from this fishery, while perpetuating sufficient brood stock to maintain the resource at a level capable of sustaining the optimal yield, include a system of fishing seasons, area closures, gear regulations, restrictions on sex of crab harvested, harvest levels, and minimum size limits.

(1) *Fishing seasons* expressed as periods of time when fishing is permitted can be manipulated to:

(a) permit economically efficient harvesting while assuring that necessary brood stock will be preserved.

(b) selectively protect weak stocks.

(c) protect sensitive periods of crab life cycles, e.g., egg hatching, soft shell and mating periods.

(d) effect greater dispersion of excessive fishing efforts.

(2) *Area closures* delineate the area where fishing may not be conducted and often complement seasonal regulation. Subareas such as bays may be closed to protect female, immature, or soft-shell Tanner crab from excessive handling. Inseason closures are necessary when the appropriate harvest level has been taken.

(3) *Fishing gear regulation* involves defining permissible gear types and amounts.

(a) *Legal gear* is restricted to Tanner crab pots and where appropriate, to ring nets and scuba diving.

(b) *Limitations on numbers of pots* is required in some areas to provide compatibility with pot limits in the king crab fishery for enforcement purposes.

(4) *Sex limitation regulation* protects the reproductive potentials of Tanner crab stocks by restricting the harvest to males only.

(5) *Size limits and harvest levels* are used in concert to optimize the annual harvest and to avoid industry dependence on maturing male crab in the fishery. These measures operate to establish a sufficiently broad spectrum of legal size crab in sufficient quantities and are determined by or concerned with:

(a) Size at maturity and growth per molt after maturity;

(b) Age dependent mating behavior;

(c) Avoiding dependence on a "recruits only fishery";

(d) Maintaining productivity of all segments of brood stocks.

Inseason adjustments to anticipated harvest levels are made as the fishery provides a real-time measure of the status of stocks.

The current statewide size limit is 5.5 inches (140 mm), except for Prince William Sound where it is 5.3 inches (135 mm).

I.B. MECHANISMS TO IMPLEMENT MANAGEMENT MEASURES AND FACILITATE ENFORCEMENT

The expanse of Alaska's coast precludes the capability of directly patrolling all of the potential Tanner crab fishing grounds for enforcement of the conservation and management measures. Clearly, indirect measures are necessary so that the regulations implementing the necessary management measures are enforceable. This section outlines a system that minimizes the need and cost of direct enforcement. This system consists of a landing law approach, area landing/loading laws, area registration and inspection, and description and marking of Tanner crab gear.

(1) *The Landing Law Approach:* The landing law system prohibits the *landing*, including the possessing, vending, trading, transporting, or purchasing of all Tanner crab taken contrary to regulations, and it applies to the possession of Tanner crab gear in operable condition in areas or at times contrary to regulation. The immediate alternative to this form of conservation program is direct enforcement—a costly, inefficient program.

(2) *Area Registration and Inspection: Area registration* is designed to implement the landing law concept for individual registration areas and thereby facilitates management of individual Tanner crab fisheries according to local conditions. Area registration provides an important information base for instituting conservation measures and for dispersing the fleet. The regulation areas generally conform to the biological boundaries of the stocks within each area. The function of registration is to limit the number of areas in which a vessel may operate and to determine the size and capacity of the fleet that will be operating in a given area. The registration areas are composed of two kinds—exclusive and nonexclusive. *Exclusive registration areas* are generally areas of developing Tanner crab fisheries, or relatively unexplored areas or areas where fishing effort is encouraged in order to gain further information concerning the resource in that area.

Inspection is used to validate the registration of vessels immediately prior to fishing. A vessel may only be validly registered for *one area* at a time in order to insure accurate reporting of catch location. The combined purpose of registration, inspection, and landing restrictions, through practical limitations on operations, is to allow only those landings of Tanner crab where it is highly probable that such crab were not taken from unauthorized areas. In order to minimize the impact of limiting markets for fishermen in that area, provisions are made for landing in other areas by radio contact.

(3) *Catch Reporting:* Catch reporting by the fishermen and the buyers is necessary for proper management, revenue collection, value determination and fishery enforcement. When a Tanner crab fisherman lands his catch, a report in the form of a "fish ticket" must be made. The information requested provides a statistical data base of the fishery.

(4) *Description and Marking of Crab Pot Gear:* Tanner crab buoys must be marked in a manner to identify the vessel fishing the gear. Tanner crab pots should also be described, by regulation, in a manner which will separate them from pot gear being fished for other species of shellfish or bottomfish and the use of pots described as Tanner crab pots should be prohibited in waters closed to Tanner crab fishing. Storage of pots in non-fishing condition in shallow water can be permitted. The purpose of these requirements is to preclude fishing of Tanner crab in closed waters.

I.C. MANAGEMENT MEASURES AND RATIONALE FOR FOREIGN FISHING

This section of the plan governing foreign fishery conditions, including details of necessary regulations and statistical reporting requirements, is closely patterned after the stipulations in the 1977 Preliminary Fishery Management Plan for the eastern Bering Sea king and Tanner Crab. It identifies a portion of the Bering Sea where foreign fisheries will be confined largely to the Tanner crab species *Chionoecetes opilio*.

Crab fishing is prohibited south of 58° N. latitude and east of 164° W. longitude. The allocation to foreign pot fisheries directed at Tanner crab in 1978 will be set 20 percent higher than the 1977 catch level of 27,550,000 pounds (12,500 metric tons). The 1978 FAC has been set at 15,000 mt (33,060,000 lbs.).

II. DESCRIPTION, CONDITION AND CAPACITY OF THE FISHERY

Major Alaskan Tanner crab fisheries are located in the area extending around the Gulf of Alaska rim, from southeastern Alaska westward to the Bering Sea. The target specie in all major areas is the *Chionoecetes bairdi*. Alaska's Tanner crab resources are generally judged to be in healthy condition and will support an acceptable biological catch (ABC) of 139.8-163.8 million pounds (63,430-74,319 mt) of *C. bairdi* and 333 million pounds (151,050 mt) of *C. opilio*. Harvest capacity (DAC), processing capacity, maximum sustainable yield (MSY), ABC, optimal yield (OY), expected domestic harvest (DAH) and foreign allowable catch (FAC) for each management area are summarized in Table A.

TABLE A.—*Alaska Tanner crab domestic annual capacity of fleet (DAC), processing capacity, maximum sustainable yield (MSY), acceptable biological catch (ABC), optimum yield (OY), expected domestic annual harvest (DAH), and foreign allowable catch (FAC) by management area for the 1977-78 season.*

	DAC		Processing capacity		MSY		ABC		OY		DAH		FAC	
	10^6 lbs	MT	10^6 lbs	MT	10^6 lbs	MT	10^6 lbs	MT	10^6 lbs	MT	10^6 lbs	MT	10^6 lbs	MT
Southeastern:														
Southeast	8	3,739	30	13,608	2.5	1,134	2.5	1,134	2.5	1,134	2.5	1,134	0	0
Yakutat	5	2,029	30	13,608	3	1,361	3	1,361	3	1,361	3	1,361	0	0
Prince William Sound	11	4,808	20	9,072	7.2	3,266	3-7	1,361-3,175	3-7	1,361-3,175	3-7	1,361-3,175	0	0
Cook Inlet	38	17,237	30	13,608	5.3	2,404	5.3	2,404	5.3	2,404	5.3	2,404	0	0
Kodiak	38	17,237	162	73,440	21.5	9,752	15-25	6,804-11,340	15-25	6,804-11,340	15-25	6,804-11,340	0	0
South Peninsula/Aleutian:														
South Peninsula	44	20,049	24	11,057	20	9,072	20-30	9,072-13,608	20-30	9,072-13,608	20-30	9,072-13,608	0	0
Aleutian	28	12,474	135	61,236	2	907	2	907	2	907	2	907	0	0
Bering Sea:														
C. bairdi	135	61,055	180	81,648	89	40,381	89	40,381	89	40,381	89	40,381	0	0
C. opilio:														
S. of 58° N. Lat.					225.0	102,000	225.0	102,000	22.04	10,000	22.04	10,000	0	0
N. of 58° N. Lat. and W. of 164° W. Long.					225.0	102,000	225.0	102,000	36.06-38.06	16,360-17,268		1,360-2,268	33.06	15.0

*A minor portion of this allocation of Tanner crab may be comprised of *C. bairdi* and hybrids.
**Foreign fishing for Tanner crab is prohibited south of 58° North Latitude to protect the stocks of *C. bairdi* which will be fully utilized by the U.S. fishery.

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2.0 INTRODUCTION

This document is a comprehensive management plan for Tanner crab off Alaska in response to the requirements of the Fisheries Conservation and Management Act of 1976 (U.S. Pub. L. 94-265). This plan incorporates, consistent with the national standards, the other provisions of the Act, and the Federal regulations governing foreign fishing in the conservation zone, the management measures and regulations of the State of Alaska.

2.1 GOALS AND OBJECTIVES FOR MANAGEMENT PLAN

This management plan is designed to meet the requirements of the Fisheries Conservation and Management Act and the National Standards by achieving the following objectives:

1. Promote conservation while providing for the optimal yield from the Tanner crab resource in terms of: Providing the greatest overall benefit to the Nation with particular reference to food production and recreational opportunities; avoiding irreversible or long-term adverse effects on fishery resources and the marine environment; and insuring availability of a multiplicity of options with respect to the future uses of these resources.

2. Promote, where possible, efficient utilization of the Tanner crab resource except that no conservation or management measures shall have economic allocation as their sole purpose.

3. Promote fair and equitable allocation of identified available resources in a manner such that no particular group acquires an excessive share of the privileges.

4. Base the plan on the best scientific information available.

In accomplishing these broad objectives a number of secondary objectives are considered:

a. Conservation and management measures should take into account the unpredictable characteristics of future resource availability and socio-economic factors influencing the viability of the industry.

b. Where possible, individual stocks of fish should be managed as a unit throughout their range, but such management should be in due consideration of other potentially impacted resources.

c. In such instances when stocks have declined to levels below that capable of producing MSY, management measures should promote rebuilding the stocks. In considering the rate of rebuilding, factors other than biological considerations should be taken into account.

d. Management measures, while promoting efficiency where practicable, should seek to avoid disruption of existing social and economic structures where fisheries appear to be operated in reasonable conformance with the Act and have evolved over a period of years as reflected in community characteristics, processing capability, fleet size and distribution. These systems and the resource upon which they are based are not static, but change in the existing regulatory regime should be the result of considered action based on data and public input.

e. Management measures should contain a margin of safety in recommending allowable biological catches when the quality of information concerning the resource and the ecosystem is highly limited. The management plan should provide for assessing biological and socio-economic data in such instances where the information base is inadequate to effectively establish the biological parameters of the resource or to reasonably establish optimum yield. The plan should identify information and research required for further plan refinement.

f. Fishing strategy should be designed in such a manner as to have minimal impact on other fisheries and the environment in which they operate.

2.2 OPERATIONAL DEFINITIONS OF TERMS USED

The North Pacific Fisheries Management Council has adopted the following working

definitions of terms used in the development of management plans.

A. DETERMINANTS OF CATCH LEVELS

1. *Maximum Sustainable Yield* (MSY) is an average over a reasonable length of time of the largest catch which can be taken continuously from a stock under current environmental conditions. It should normally be presented with a range of values around its point estimate.

Where sufficient scientific data as to the biological characteristics of the stock do not exist or the period of exploitation or investigation has not been long enough for adequate understanding of stock dynamics, the MSY will be estimated from the best information available

2. *Equilibrium Yield* (*EY*). The annual or seasonal harvest which maintains the resource at approximately the same level of abundance (apart from the effects of environmental variation) in succeeding seasons or years.

3. *Acceptable Biological Catch* (ABC) is a seasonally determined catch that may differ from MSY for biological reasons. It may be lower or higher than MSY in some years for species with fluctuating recruitment. It may be set lower than MSY in order to rebuild overfished stocks.

4. *Optimum Yield* (OY) may be obtained by a plus or minus deviation from ABC for purposes of promoting economic, social or ecological objectives as established by law and public participation processes. Ecological objectives, where they primarily relate to biological purposes and factors, are included in the determination of ABC. Where ecological objectives relate to resolving conflicts and accommodating competing uses and values, they are included as appropriate with economic and/or social objectives.

OY may be set higher than ABC in order to produce higher yields from other more desirable species in a multi-species fishery. It might be set lower than ABC in order to provide larger sized individuals or a higher average catch per unit effort.

B. DETERMINATION OF DOMESTIC ANNUAL CAPACITY AND EXPECTED HARVEST

1. *Domestic Annual Fishing Capacity* (DAC) is the total potential physical capacity of the fleets, modified by logistic factors. The components of the concept are:

a. An inventory of total potential physical capacity, defined in terms of appropriate vessel and gear characteristics (e.g., size, horsepower, hold capacity, gear design, etc.)

b. Logistic factors determining total annual fishing capacity, (e.g., variation in vessel and gear performance, trip length between fishing locations and landing points, weather constraints, etc.).

2. *Expected Domestic Annual Fisheries Harvest* (DAH) is the domestic annual fishing capacity modified by other factors which will determine estimates of what the fleets will harvest (e.g., how fishermen will respond to price changes in the subject species and other species, etc.).

These concepts should be placed in a dynamic context of past trends and future projections. For example, physical fleet capacity should not simply be last season's inventory of vessels and hold measurements (although this is appropriate for present interim planning), but also next year's projected movement into and out of the fishery. Vessels under construction should be included and an estimate of attrition made.

The determination of domestic annual fishing capacity and expected harvest should be made on the best available information.

C. *Determination of Foreign Allowable Catch* (FAC). The foreign allowable catch is determined by deducting the domestic annual expected harvest from the optimum yield (OY-DAH=FAC).

3.0. DESCRIPTION OF FISHERY

3.1. AREAS AND STOCKS

The Tanner crab fishery in Alaskan waters is located from Southeastern Alaska to the Bering Sea. Two species of the genus *Chionoecetes*, *C. bairdi* and *C. opilio*, are the target species of this fishery. *C. bairdi* is the principal target and has comprised 90–95 pecent of the commercial catch.

Alaska Tanner crab stocks are managed in specific administrative fishery units called management areas (Fig. 1). Each management area is described in this plan and the reader will be referred to these sections for specific area information. The present regulations governing conduct of these fisheries are organized into "statistical areas" in the 1977 regulations of the Alaska Board of Fisheries for commercial shellfish fishing in Alaska (Appendix 11.2). The correlation between management areas and statistical areas is show below.

Management area	Statistical area
Southeastern	A
Prince William Sound	E
Cook Inlet	H
Kodiak	J (westward)
South Peninsula/Aleutian	Do.
Bering Sea	Do.

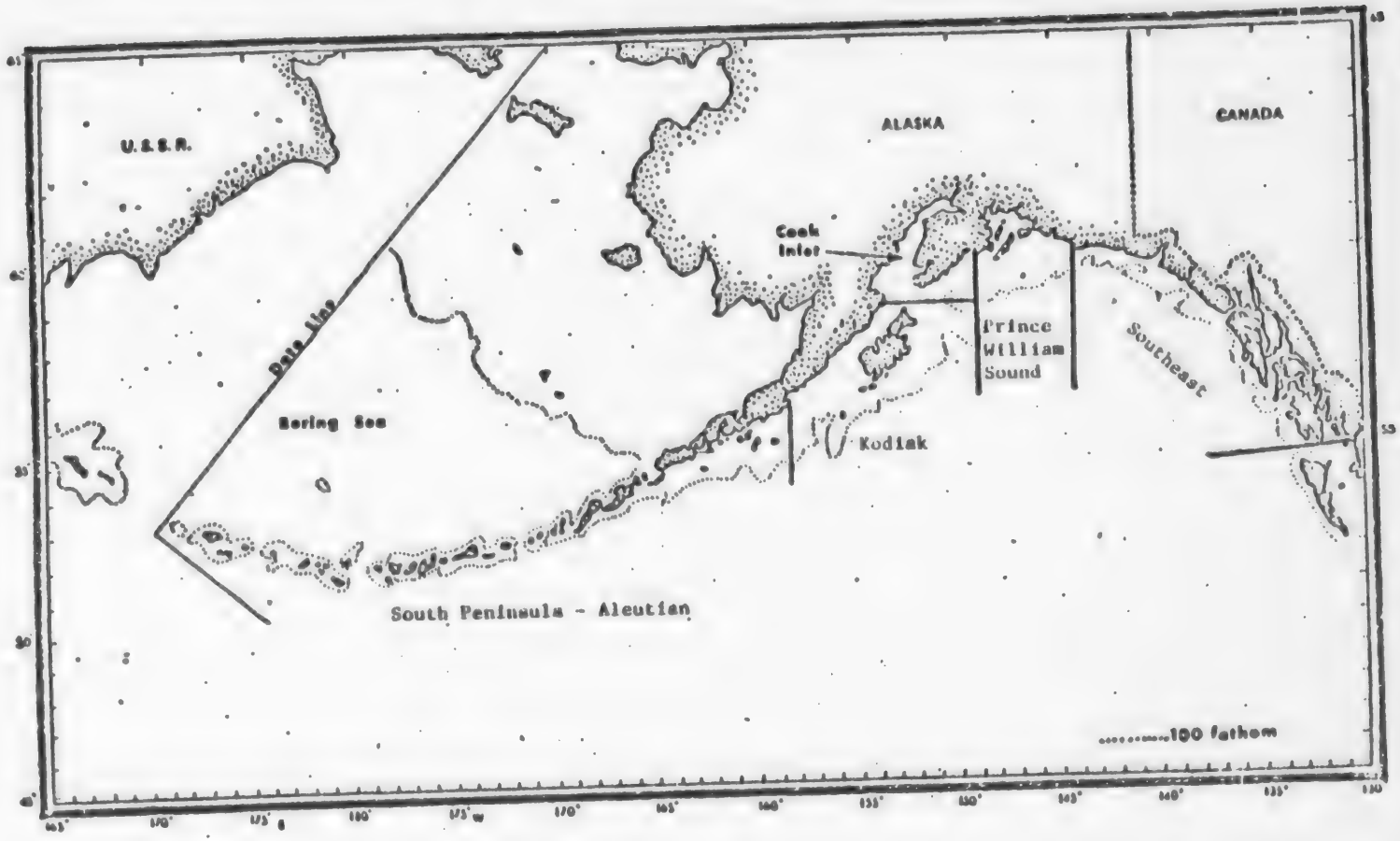


Fig 1. THE SIX TANNER CRAB MANAGEMENT AREAS IN ALASKAN WATERS.

3.2 HISTORY OF EXPLOITATION

3.2.1 Domestic Fishery

The Tanner crab resource in Alaska was first utilized by the fishing fleet in 1961 with a harvest of 6,800 pounds (3.18 mt) valued at $680. The harvest increased to 61,344,454 pounds (27,826 mt) in 1973 with a value of $11,072,449 (Table 1). The 1977 harvest of over 94 million pounds (42,800 mt) was the largest catch recorded for the State.

Several factors contributed to the rapid development of this fishery. The king crab (*Paralithodes camtschatica*) harvest suffered a steady 4-year decline from its peak of nearly 160 million pounds (72,560 mt) in 1966 to about 50 million pounds (22,675) in 1970. In this same period, the Tanner crab harvest increased by over 100 fold. This increase is attributed to a change in fishing effort from king crab and salmon toward Tanner crab and an apparent increase in abundance of Tanner crab related to the declining abundance of king crab, except in the eastern Bering Sea (Gulland 1972). Tanner crab fishing provides additional income to fishermen during the winter months when king crab and salmon are not being harvested in most areas of the State.

The 1976 domestic Tanner crab fishery centered around Kodiak Island and the Bering Sea with harvests of 23.4 and 22.3 million pounds (10,614 and 10,115 mt), respectively. The Alaska Peninsula/Aleutian area produced 17.8 million pounds (8,081 mt), Cook Inlet produced 5.9 million pounds (2,692 mt) and Southeastern produced 3.5 million pounds (1,593 mt). Total Alaskan harvest of Tanner crab was 79 million pounds (35,850 mt) in 1976. Preliminary data for the Bering Sea indicates a 1977 harvest of 51.5 million pounds (23,360 mt), ranking this area as the most productive in the State.

3.2.1.1 *Description of User Groups*

Tanner crab in Alaska are harvested primarily for commerical purposes by domestic fishermen (resident and non-resident) and Japanese nationals fishing in the eastern Bering Sea.

There is no licensed recreational fishery for Tanner crab. Local residents, however, catch Tanner crab for their own use in a subsistence fishery.

3.2.1.2 *Fishing Effort*

Data are not available which will allow a quantitative summary of directed effort in this fishery in terms of pot lifts or standardized vessel days of fishing on a statewide basis. Within the various portions of this plan dealing with the specific management areas, estimates of these parameters have been made when data were available. Statewide, during 1976, over 350 vessels participated in the commercial harvest making 3,743 individual landings for which fish tickets were issued. Table 1 provides catch, value, number of vessels, and number of landings for 1969 to 1976.

TABLE 1. ALASKA TANNER CRAB CATCH, VALUE, AND PARTICIPATION BY AREA AND YEAR (not by season).

COMPILED BY COMMERCIAL FISHERIES ENTRY COMMISSION. (Domestic fishery only)

YEAR	MANAGEMENT AREA	NO. of VESSELS	NO. OF LANDINGS	TOTAL POUNDS	METRIC TONS	TOTAL EX-VESSEL VALUE
1969	Southeastern	40	359	267,500.00	121	26,750.00
	Prince William Sound	19	245	944,881.97	429	103,937.03
	Cook Inlet	29	405	1,432,869.12	650	157,615.58
	Kodiak	116	973	6,861,700.44	3,112	686,170.16
	S.Peninsula/Aleutian	43	190	670,285.98	304	67,027.64
	Bering Sea	42	131	1,014,835.92	460	101,483.76
	TOTAL		2303	11,192,073.43	5,077	$ 1,142,984.17
1970	Southeastern	27	201	583,153.02	265	64,133.37
	Prince William Sound	13	270	1,292,423.99	586	129,242.36
	Cook Inlet	27	319	1,328,694.03	603	132,869.43
	Kodiak	82	668	7,710,455.08	3,497	771,045.18
	S.Peninsula/Aleutian	33	311	2,093,648.04	950	188,428.35
	Bering Sea	28	112	1,464,394.12	664	131,795.44
	TOTAL		1853	14,472,768.28	6,565	$ 1,417,514.13
1971	Southeastern	17	319	251,082.01	114	25,108.15
	Prince William Sound	20	130	642,340.00	291	70,657.40
	Cook Inlet	44	615	2,116,848.80	960	211,684.88
	Kodiak	56	443	7,536,060.96	3,418	831,936.56
	S.Peninsula/Aleutian	18	265	2,140,754.94	971	214,075.44
	Bering Sea	9	23	166,037.04	75	14,943.33
	TOTAL		1795	12,853,123.75	5,830	$ 1,368,405.76
1972	Southeastern	30	336	790,146.90	358	108,556.20
	Prince William Sound	47	858	8.550,709.06	3,878	1,026,085.20
	Cook Inlet	54	1096	4,779,234.90	2,168	716,885.10
	Kodiak	64	662	11,933,107.20	5,413	1,431,973.12
	S. Peninsula/Aleutian	32	281	3,941,933.94	1,788	433,612.76
	Bering Sea	13	37	111,664.02	51	11,166.35
	TOTAL		3270	30,106,796.02	13,656	$ 3,728,278.73
1973	Southeastern	50	411	1,893,086.00	859	323,894.00
	Prince William Sound	51	1036	12,696,850.86	5,759	2,158,464.84
	Cook Inlet	92	1525	8,134,274.76	3,690	1,382,827.16
	Kodiak	135	1648	32,437,983.60	14,714	5,838,836.40
	S. Peninsula/Aleutian	53	435	5,880,391.01	2,667	943,138.65
	Bering Sea	22	50	301,867.94	137	51,317.64
	TOTAL		5105	61,344,454.17	27,826	$ 11,072,448.85
1974	Southeastern	54	451	3,087,512.10	1,401	584,708.22
	Prince William Sound	54	648	9,597,758.04	4,354	1,919,551.50
	Cook Inlet	90	1169	7,660,895.40	3,775	1,532,178.90
	Kodiak	136	1542	29,562,133.68	13,409	6,208,047.76
	S.Peninsula/Aleutian	65	504	9,057,068.97	4,108	1,818,142.46
	Bering Sea	26	100	5,044,197.08	2,288	1,059,281.34
	TOTAL		4414	64,009,565.27	29,034	$ 14,207,919.30
1975	Southeastern	41	296	3,032,249.00	1,375	439,676.00
	Prince William Sound	34	396	5,016,655.00	2,276	702,332.00
	Cook Inlet	54	520	4,952,428.00	2,646	693,340.00
	Kodiak	102	825	17,540,580.00	7,956	3,095,546.00
	S.Peninsula/Aleutian	52	359	8,628,427.00	3,914	1,206,545.00
	Bering Sea	27	101	7,028,378.00	3,188	913,689.00
	TOTAL		2497	46,188,712.00	20,951	$ 7,051,128.00
1976	Southeastern	28	234	3,511,528.00	1,593	772,536.00
	Prince William Sound	39	491	6,000,444.00	2,722	1,200,089.00
	Cook Inlet	72	872	5,935,299.00	2,692	1,246,413.00
	Kodiak	105	1119	23,446,245.00	10,635	4,924,284.00
	S. Peninsula/Aleutian	84	630	17,816,045.00	8,081	3,560,162.00
	Bering Sea	66	397	22,324,490.00	10,126	4,353,276.00
	TOTAL		3743	79,034,051.00	35,850	$ 16,056,760.00

During 1977 effort in the Bering Sea doubled, remained constant in Kodiak, Cook Inlet, and Southeastern and declined slightly in the South Peninsula/Aleutian and Prince William Sound Management areas.

3.2.1.3 Catch Trends

The Alaska catch of Tanner crab has shown a steady yearly increase from a 1961 harvest of 6,800 pounds (3.1 mt) to a 1977 preliminary harvest of 94 million pounds (42,800 mt).

3.2.1.4 Description of Vessels and Gear

Vessels. The size and configuration of the vessels engaged in Alaska's Tanner crab fishery vary between regions and are described in the management area sections. Most vessels participating in the Tanner crab fishery in the Bering Sea, Kodiak and South Peninsula/Aleutian area are large, efficient, combination vessels capable of fishing open waters under adverse weather conditions. As such, these vessels have the potential of moving to and fishing in any management area in the State.

Types of Gear. Pots are the only type of commercial fishing gear in the Tanner crab fishery. Three pot designs are currently in use: (1) modified variation of the conventional king crab pots; (2) specially designed "pyramid" shaped pots; and (3) Japanese conical pots. Ring nets and scuba are also legal gear, but are used in the subsistence fishery.

3.2.2 History of Foreign Exploitation

3.2.2.1 Description of User Groups

Fishermen from two major foreign nations, Japan and the Soviet Union, have harvested Tanner crab in areas of the Bering Sea which now fall within the boundaries of the U.S. Conservation Zone.

3.2.2.2 and 3.2.2.3 Catch Trends and Description of Fishing Effort

Tanner crab harvested in the eastern Bering Sea prior to 1964 were caught incidentally in the king crab fisheries. Bilateral agreements with Japan and the U.S.S.R., in 1964, when the combined Soviet and Japanese king crab fisheries were at their peak, resulted in immediate reductions in the foreign production of king crab. Foreign emphasis then shifted to Tanner crab and the combined Japanese-Soviet Tanner crab catch increased rapidly to about 24 million crab in 1969 and 1970 (Table F1, p. 235). Since 1970, quotas for Tanner crab have sharply reduced foreign landings. The Japanese quotas for Tanner crab in 1977 is 27,550,000 pounds (12,500 mt). As was the case for king crab, the Soviet Tanner crab fishery ended after 1971.

Japanese trawlers incidentally catch substantial numbers of Tanner crab annually in the eastern Bering Sea. According to U.S. observer data, 155 million Tanner crab were caught incidentally in 1974 (French et al., 1976). Preliminary data indicate a decreased catch in 1975 of 58 million crab, owing primarily to a lower observed incidental catch rate. Although these crab must be returned to the ocean, mortality is estimated to be 60–70 percent. Taking into consideration the best available data on the time span between size at incidental capture and at recruitment and the rate of natural mortality, it is estimated that the total loss of Tanner crab to the fishable population generated by the 1974 incidental catch is 31 million pounds (14,100 mt); by the 1975 catch, 15 million pounds (6,800 mt). These losses, estimated to be approximately 85 percent *C. opilio*, approach the annual magnitude of the directed catch.

3.2.2.4 Vessels and Gear Types Employed

No Soviet crab fishery has occurred in the eastern Bering Sea since 1971. Two factoryships have been utilized by Japan to process crab in recent years, supplied by six catcher boats each. A Japanese landbased fleet has operated generally north and west of the factoryship fleet for Tanner crab since the early 1970's. In 1976, 31 vessels operated while for the 1977 season only 11 were licensed. These vessels are 2—5 times the size of the factoryship catcher boats and utilize identical gear. Further detail on vessels and gear will be found in the Bering Sea section of this plan.

3.3 History of Management

3.3.1. Domestic Management Institutions, Policies, Jurisdictions

Institutions. The state organizational act of 1959 provided for Alaska Statutes, Title 16, which deals with Alaska Fish and Game Resources. Article 1 provides for a Department of Fish and Game whose principal executive officer is the Commissioner of Fish and Game. The Commissioner is appointed by the Governor for 5 years. Functions of the Commissioner are:

1. Supervise and control the department, and he may appoint and employ division heads, enforcement agents, and the technical, clerical, and of the assistants necessary for the general administration of the department;

2. Manage, protect, maintain, improve, and extend the fish, game and aquatic plant resources of the state in the interest of the economy and general well-being of the state;

3. Have necessary power to accomplish the foregoing including, but not limited to, the power to delegate authority to subordinate officers and employees of the department.

The Commercial Fisheries Division was established to manage all commercially harvested fish species in Alaska. The division is headed by a director who supervises four regional supervisors. The regions are further separated into management areas. Area management biologists are responsible for collecting catch data and monitoring fisheries in their areas.

Research biologists within the divison work on projects which have direct application to management procedures. Research studies are currently conducted on Tanner crab life history, migration patterns and population abundance.

The enforcement of fish and game laws and regulations is provided by the Department of Fish and Game and Public Safety. The Fish and Wildlife Protection Officers of the Department of Public Safety operate independently of the Department of Fish and Game. Communication between the two departments is maintained and activities are coordinated.

The Fisheries Regulatory Process. The Alaskan system has a seven-member Board of Fisheries, composed of fishermen and other businessmen appointed by the Governor, which considers both public and staff regulatory proposals in deciding on regulatory changes.

The Alaska Board of Fisheries is required by Law to meet or hold a hearing at least once a year in each of the following areas of the state: (1) Upper Yukon-Kuskokwim-Arctic, (2) Western Alaska (including Kobiak), (3) South Central, (4) Prince William Sound (including Yakutat), and (5) Southeast, in order to assure all people of the state ready access to the Board.

Since the late 1960's the Alaska Board of Fisheries and, before it, the Alaska Board of Fish and Game have held a minimum of two meetings annually to adopt changes in the fisheries regulations. The fall Board meeting, traditionally held in early December, considers proposals for changes in sport fishing regulations and in commercial and subsistence finfish regulations. A spring Board meeting, usually held in late March or early April, considers commercial and subsistence shellfish regulatory proposals.

Regulations which may be adopted by the Board of Fisheries cover seasons and areas, methods and means of harvesting, quotas, and times and dates for issuing or transferring licenses and registrations.

Advisory committees, composed of people informed on the fish and game resources of their locality, serve as local clearinghouses and sources of proposals for Board consideration.

Following submission of public proposals, department staff members review the proposals and redraft the wording, when necessary, to conform to the style required. The Department of Fish and Game also submits proposals for the Board's consideration.

In adopting new regulations, the Board of Fisheries follows Alaska's Administrative Procedure Act. This act has several requirements: At least 30 days prior to the adoption of new regulations, a notice giving the time and place of the adoption proceedings, reference to the authority under which the regulations are proposed, and a summary of

the proposed action must be published in a newspaper of general circulation and sent to all interested people who have asked to be informed of the proposals. During the proceedings, the public must be given an opportunity to testify on the proposed changes. If a new regulation is adopted, it must be submitted to the lieutenant governor through the attorney general's office. Thirty days after being filed with the lieutenant governor, the new regulation becomes effective. Because of these requirements, new regulations usually do not become effective until about two months after being adopted by the Board of Fisheries.

Regulatory flexibility is given to the Commissioner of Fish and Game and to his authorized designees to adjust seasons, areas, and weekly fishing periods by emergency order.

The requirements of the preceeding paragraph do not apply in the case of emergency regulations, which may be adopted if needed for the immediate preservation of public peace, health, safety, or general welfare. An emergency regulation remains in effect 120 days unless it is permanently adopted according to the procedures outlined in the preceding paragraph.

This authority has the same force and effect as regulations promulgated by the Board of Fisheries.

Policies. Policies governing fisheries management in Alaska are issued by the Board of Fisheries and the Commissioner.

Jurisdiction. The Alaska Department of Fish and Game has sole management authority over all migratory fish and shellfish species which enter and leave territorial waters of the state during any given year including the migratory fish and shellfish taken from state waters which are indistinguishable, in most instances, from those taken from adjacent high seas areas. Regulations governing migratory fish and migratory shellfish apply in both areas and are enforced by the landing law explained in section 3.4 of this plan.

3.3.2 Domestic

3.3.2.1 & 3.3.2.2 Regulatory Measures and Purpose of Measures

The Tanner crab resource in Alaska is managed by a complex of regulatory measures that have been developed as the commercial fishery has increased its capacity to harvest the resource. The fishery is managed by fishing season, specification of type and quantity of gear, sex limitation, size limits, fishing area restrictions, and harvest levels.

The common pattern of fisheries development world-wide is one of increasing resource exploitation followed by research and increasingly restrictive regulations to prevent or arrest declines in stock abundance. All too often, adequate funding is not made available for biological research until the resource shows some signs of distress. The result in many cases is intensive exploitation with accompanying industry overcapitalization based on harvest of virgin stocks followed by a decline in resource abundance of varying degrees and economic distress to the industry.

Significant harvests of Tanner crab in most areas date back only to the late 1960's, followed by a rapid increase to the present. There is no history of the effects of harvest of varying sizes on the stocks. Research in most areas is not adequate to define with precision natural variations in stock abundance, stock recruit relationships, age, growth, mortality parameters and discrete stock units.

In the absence of these data, the Alaska Board of Fisheries and the Alaska Department of Fish and Game have adopted a conservative approach to the development of this fishery. This approach is reflected in the regulatory regime that has been imposed. These regulations are designed to allow expansion of harvest in this developing fishery while, insofar as possible, preventing decline in abundance due to overfishing and minimizing economic disclocation. For reference, a copy of the current State of Alaska Tanner Crab Regulations have been appended (Appendix 11.2).

Research programs are being expanded within the constraints of available funding and as new information becomes available, regulatory measures may be modified. The lack of precision in defining stock parameters requires that a degree of flexibility be maintained so that the manager can expand or restrict harvests by area during a fishing season.

The current State of Alaska regulatory regime emphasizes three primary objectives and procedures to accomplish them:

1. Maximize yield from harvestable surpluses: This is accomplished by seasons and gear restrictions to increase meat yield per individual crab and reduce mortality on sublegal crab.

2. Maximize reproductive potential of the Tanner crab stocks by: (a) imposing seasons, gear restriction, size and sex limits and harvest levels to protect crab during reproduction; (b) minimizing mortality on female crab due to handling or harvest: and (c) assuring full female fertilization by providing adequate numbers of males of all sizes for breeding.

3. Seek economic stability in the Tanner crab industry. Avoiding over-capitalization based on levels of population abundance which may not be sustained over time by; (a) regulating annual harvest to discourage too rapid expansion of harvesting and processing capability until resource potential can be better evaluated and; (b) by stabilizing harvest levels within the range of natural recruitment fluctuation if not precluded by excessive natural mortality beyond the first year at maturity.

Fishing Seasons. To sustain optimum levels of Tanner crab production, seasonal closures are required during certain periods of their life cycle. Closed seasons encompass molting, peak breeding of oldshell females (assuming they remate) and egg hatching periods. Seasonal closures assumedly allow time preceding peak breeding periods so that male breeders are not over harvested as schooling occurs immediately prior to breeding. Seasonal openings are delayed following molting periods until shell condition has hardened enough to allow handling with minimum mortality and damage to nonlegal crabs that must be returned to the waters, and to legal crabs so that they are delivered in a marketable condition. Seasons' opening dates should be set after molting and after adequate growth to take advantage of weight gain, thereby increasing the amount of meat recovered from each animal.

Type of gear. Legal gear for Tanner crab is defined as pots, ring nets, or scuba. These gear types are all selective in that non-legal crab may be released unharmed. Non-legal crab are females and undersized male crab. If non-selective gear were employed (trawls, tangle nets) many non-marketable crab would be harvested with high mortalities occurring during the catching procedure. Pots provide the fishermen with an efficient selective gear type which does the least amount of damage to the non-harvestable portion of the stocks.

Quantity of gear. Limitations on the units of gear per vessel are applied in four management areas to avoid conflicts with established pot limits for king crab during overlapping portions of fishing seasons for king and Tanner crab. In one management area (Southeastern) a pot limit has been established for small inside populations isolated geographically from major stocks.

Sex limitations. Protection of the female Tanner crab population from harvest, if accompanied by the maintenance of a mature male population adequate to insure total fertilization of mature females, should guarantee that there will be no adverse effects due to harvest on the reproductivity of the Tanner crab stock. The harvest has therefore been restricted to only males above a certain size limit.

Females do not grow beyond the molt to maturity and are not currently demanded by processors due to their relatively smaller size. Thus, the male-only fishery restriction does not impose an adverse economic impact on the fishery.

Size limits. The major species of Tanner crab (*C. bairdi*) in the Alaskan fisheries can probably be harvested profitably at the size of maturity for males (see section 4.0). However, a fishery operating on male crab just reaching maturity could reduce the reproductive potential of the stocks, since a portion of the males would be harvested before having an opportunity to mate. This could result in less than total fertilization of the available mature female population. It is possible that full female fertilization might be achieved utilizing less than 100 percent of the male population being allowed to breed for one season before being exposed to harvest. This determination would require data on the number of mature males and females (and male breeding efficiency) by stock unit. In the absence of such information, the conservative policy of obtaining full female fertilization is best served by the imposition of the minimum legal size that will allow male crab at least one opportunity to breed before being recruited into the fishery. Nearly all Tanner crab males has been found to be mature at 5.3 inches (136 mm) carapace width in populations studied. To allow for annual area fluctuations, a 5.5 inch (140 mm) minimum shell width limit has been imposed statewide with the exception of Prince William Sound where the limit is 5.3 inches.

Harvest levels. The rapid expansion of Tanner crab harvests in advance of adequate biological assessment programs coupled with a lack of good definition of stock units could lead to over exploitation of some stocks and under exploitation of others. A lack of knowledge of variations in annual recruitment could also lead to industry overcapitalization and dependence on stocks currently at a high level of abundance which in fact may not sustain a given level of harvest.

The Board of Fisheries has further indicated a conservative approach to the development of this fishery by adopting guideline harvest levels for most areas. These harvest levels serve to inform the industry that unrestricted harvest expansion (even of crab above a certain size limit) may not be desirable. These harvest levels are nor-

mally expressed as ranges to give the manager the flexibility to adjust the harvest during the season based on catch per unit effort by geographical area, indexes of abundance research results, or variation in shell condition by date.

Fishing area restrictions. Fishing areas are generally designed for manageable stocks or aggregates of stock units. Areas may be further subdivided into districts for statistical and regulatory purposes.

Exclusive registration areas have also been designated. These areas help to reduce the rate of harvest and serve to prevent economic dislocation of a certain segment of the industry dependent on a stock(s), particularly if the character of the fishing fleet and the industry that depends on it would not allow movement to another area.

3.3.3. Foreign

3.3.3.1. & 3.3.3.2. Regulatory Measures and Purpose of Measures

Prior to 1964, there were no U.S. regulations for the foreign crab fisheries of the eastern Bearing Sea. In 1964, the United States ratified the 1958 Continental Shelf Convention and declared king and Tanner crab (among other species) as "Creatures of the Continental Shelf". In that same year, bilateral arrangements were concluded with both Japan and U.S.S.R. in which quotas and a minimum size limit were applied to their king crab catches. In addition, only hard-shell male crabs could be retained. Catch quotas were first applied to foreign Tanner crab fisheries in 1969 and use of tangle net gear was restricted in later bilaterals. These bilateral agreements were modified at 2 year intervals, resulting in progressively lower foreign quotas for both king and Tanner crabs.

Initially, regulation of the foreign fishery emphasized conservation of an apparent declining king crab resource. Later regulations limited foreign fishing to permit expansion of developing U.S. fishery on these resources.

Since 1973, separate Tanner crab quotas have applied to each of two quota areas in the Bering Sea. The quota areas were further defined in the 1975–76 bilateral to eliminate the foreign fishery east of 164° W. longitude and south of 55°30′ N. latitude—the principal area fished by the United States to that time.

The Preliminary Management Plan (PMP 1977) of the Secretary of Commerce, in effect for the 1977 season, further restricted foreign fishing on hardshell male Tanner crab by moving the southern boundary of the open fishing area from 55¼°30′ N. to 56° N. latitude. Details of regulation may be found in the FEDERAL REGISTER of February 11, 1977 and the Bering Sea section of this plan.

3.3.4. Effectiveness of Management Measures

Fishing Seasons. The restricting of the commercial harvest of Tanner crab to that interval of time after the crab have mated, molted and filled their new shells in the beginning of the new cycle has effectively protected breeding stocks, reduced handling mortality, and has resulted in a high quality product being harvested and marketed.

Type of Gear. Restricting commercial harvest of Tanner crab to the use of pots has resulted in low handling mortality of crab on the fishing grounds. It provides for fishing with an efficient selective gear type that allows the escapement of many sub-legal and female crabs.

Quantity of Gear. Limiting the number of Tanner crab pots to the equivalent number of pots which may be fished in the king crab fishery has been required for enforcement purposes during the period of time that the seasons for these two species overlap.

Sex Limitations. The harvesting of only mature males only has not shown any adverse effects on the reproductive potential of the stocks and is therefore an effective means of protecting the reproductivity of the resource.

Size limits. The 5.5 inch (140 mm) size limit is in effect for all management areas of the State except for Prince William Sound where a 5.3 inch (135 mm) size limit applies. The results of the size limit will not be known for some time in terms of the reproductive potential of the stock. However, female Tanner crab ovigerity can be monitored and related to the abundance of mature male Tanner crab.

Harvest Levels. Harvest levels for other shellfish have had a definite effect in stabilizing the catch. Applicability to maintaining stability in the Tanner crab industry will only be substantiated by measuring the results in terms of harvest ranges which can be sustained over a broad range of natural fluctuations in stock abundance. The effect on maintaining full female fertilization can only be assessed by comparing female ovigerity over time with stock levels of newly mature and older male crab. Quotas on foreign catch have effectively provided for expansion of the U.S. effort for Tanner crab in the eastern Bering Sea.

Fishing areas. Regulating by geographical areas has allowed selective application of conservation measures based on stock differences such as variations in time of molting, breeding and softshell condition. Area restrictions on the foreign fishery in the eastern Bering Sea have minimized conflicts between domestic and foreign harvesting in terms of gear interference and competition for concentrations of crab. Rapid expansion of U.S. effort on *C. bairdi* in the Bering Sea will require further restrictions in the future.

3.4. HISTORY OF RESEARCH

Research on Tanner crab in Alaskan waters has been conducted by several agencies and groups: The National Marine Fisheries Service, State of Alaska Department of Fish and Game, universities, domestic industries, and foreign nations.

National Marine Fisheries Service (NMFS). The first NMFS biological research program on Tanner crab in Alaskan waters occurred as an adjunct to two king crab cruises in the southeastern Bering Sea in 1968, followed by three similar research cruises in 1969. Data from these cruises yielded a first approximation of the distribution and abundance of Tanner crab in the southeastern Bering Sea (Karinen, 1969) as well as information on molting seasons, reproduction, size frequency distribution, larval release and abundance, associated fauna and physical environment (Hoopes 1969). Since 1969, annual crab stock assessment cruises have been conducted to monitor the populations in the southeastern Bering Sea. In 1975 and 1976, NMFS conducted OCS related surveys as far north as the southeastern Chuckchi Sea.

Experiments in Tanner crab processing were done at the Service's Technological Laboratory at Ketchikan in 1961 and 1962. In 1969, the Technological Laboratory (by that time located in Kodiak) began a research program on holding Tanner crab alive in tanks to determine methods of reducing mortality while crab are held on vessels and in processing plants.

State of Alaska. The Alaska Department of Fish and Game began studies on Tanner crab as an adjunct to its king crab research early in 1969. The state agency's shellfish research program was established to more comprehensively study the Tanner and Dungeness Crab resources being harvested in the Kodiak Island area. In July, 1973, monies obtained from the Commercial Fisheries Research and Development Act and the State of Alaska were used to create a project oriented solely towards the commercially exploited Tanner crab, *Chionoecetes bairdi.* The objective of this research project was the development of parameters which would aid in ascertaining the optimum annual yield for the fishery. Specific areas investigated were: (1) growth and age at size; (2) frequency of molt; (3) reproductive biology; (4) distribution and relative abundance of Tanner crab with respect to size and sex; (5) assessment of the effects of the commercial fishery upon the population; and (6) documentation of inter-relationships between Tanner Crab and other marine organisms (Donaldson 1977a).

Universities. Graduate student studies from the University of Alaska and the University of Washington have focused on developing life history models for both *C. bairdi* and *C. opilio.* Cooperation between university studies and the State of Alaska's research program have resulted in improved management capabilities.

Industry. Industry has done much to develop techniques of processing, storing, and marketing Tanner crab. Commercial fishermen have aided studies on the distribution and movement of Tanner crab by returning tagged crab with catch information.

Foreign Nations. Much of the current knowledge of the life history of *C. opilio* is the result of investigations by foreign nations. Research by the Japanese and Soviets has provided a great deal of information on life history aspects of the crab (Fukataki 1965). Through the auspices of the International North Pacific Fisheries Commission the Japanese initiated studies on Tanner crab in the Bering Sea in 1968 (Ito 1968; Kon 1974; Sinoda 1968).

3.5. SOCIO-ECONOMIC CHARACTERISTICS

3.5.1. *Output of Subject Domestic Tanner Crab Fishery*

3.5.1.1 Value of Catch (Ex-vessel)

Total ex-vessel value of the Tanner crab fishery in 1976 was $16,056,760. Totals by management area and statewide for the years 1969 through 1976 may be found in Table 1 on page 17.

3.5.1.2 Description and Value of Product (Wholesale)

Nineteen Seventy-Five is the latest year for which Tanner crab production and wholesale data available. (ADF&G 1975 Catch & Production Leaflet). In that year, the product forms and values were: canned Tanner crab $2,282,354; frozen whole $14,795,354; frozen section $1,672,972; and meats $621,897, totaling $19,372,577 at the first wholesale level. The wholesale value of Tanner crab products for years prior to 1976, peaked in 1973 when $33,687,678 was realized at first wholesale.

Table 2 contains the 1975 shellfish production and wholesale values.

TABLE 2 - 1975 Shellfish Production with Wholesale Values

PRODUCTS	SOUTHEASTERN[1] POUNDS	SOUTHEASTERN[1] VALUE ($)	CENTRAL[2] POUNDS	CENTRAL[2] VALUE ($)	WESTERN[3] POUNDS	WESTERN[3] VALUE ($)	TOTAL POUNDS	TOTAL VALUE ($)
King crab								
Frozen								
Whole/dressed	501,152	574,922	14,618,834	26,281,738	15,376,870	33,917,998	30,487,856	60,774,658
Sections/tails	---	---	1,511,535	1,979,478	2,689,707	5,323,343	4,201,242	7,302,821
Meat	---	---	1,665,320	1,213,008	2,921,655	10,279,648	4,586,975	11,492,656
Canned	---	---	1,074,397	4,266,922	---	---	1,074,397	4,266,922
Total	501,152	574,922	18,870,086	33,742,146	20,979,232	49,520,989	40,350,470	83,837,057
Dungeness crab								
Frozen								
Whole/dressed	788,178	682,002	1,400,301	1,297,901	1,641	2,051	2,190,120	1,981,954
Sections/tails	389	447	247,863	214,808	---	---	248,252	215,255
Total	788,567	682,449	1,648,164	1,512,709	1.641	2,051	2,438,372	2,197,209
Tanner crab								
Frozen								
Whole/dressed	844,020	751,786	12,230,326	9,518,849	4,025,600	4,524,719	17,099,946	14,795,354
Sections/tails	---	---	1,047,416	1,672,972	---	---	1,047,416	1,672,972
Meat	---	---	242,526	621,897	---	---	242,526	621,897
Canned	---	---	705,071	2,282,354	---	---	705,071	2,282,354
Total	844,020	751,786	14,225,339	14,096,072	4,025,600	4,524,719	19,094,959	19,372,577
Shrimp								
Frozen								
Whole/dressed	349,094	591,546	10,084,660	13,039,460	1,274,995	1,681,460	11,708,749	15,312,466
Sections/tails	8,501	17,288	405	347	603,060	1,453,785	611,966	1,471,398
Meat	---	---	---	---	510,420	1,722,667	510,420	1,722,667
Canned	---	---	3,652,986	6,903,208	---	---	3,652,986	6,903,208
Total	357,595	608,832	13,738,051	19,943,015	2,388,475	4,857,892	17,484,121	25,409,749
Clams								
Frozen								
Shucked	---	---	11,596	34,408	---	---	11,596	34,408
Bait	---	---	11,811	2,898	---	---	11,811	2,898
Total	---	---	23,407	37,306	---	---	23,407	37,306
Scallops								
Frozen								
Whole/dressed	---	---	409,688	635,016	---	---	409,688	635,016

1/ Southeastern management area
2/ Prince William Sound, Cook Inlet, and Kodiak management areas
3/ S. Peninsula/Aleutians, and Bering Sea management areas

Source - ADF&G Catch and Production Leaflet

3.5.1.3. Markets, Domestic and Foreign

In 1975 approximately 19 million pounds of Tanner crab products were available for distribution in frozen and canned forms from Alaska, with a wholesale value of $19.4 million. This comprises about 15 percent of the total wholesale value of shellfish in Alaska.

Tanner crab catches in 1975 and 1976 were 46 and 79 million pounds with ex-vessel values of $7 and $16 million respectively (Table 1). The composition of total Tanner crab wholesale value in Alaska by product form shows that 76.4 percent is in whole/dressed (frozen) form, 11.8 percent in canned, 8.6 percent in section/tail (frozen), and 3.2 percent in meat (frozen) form.

Adequate information dealing with domestic market channels and consumption patterns is not available. According to the Bearing Sea Tanner crab study conducted by the University of Alaska (Orth, Frank et al., 1977) 27 percent of Alaska's Tanner crab production was distributed in California. The resturant trade purchased 36 percent of the Tanner crab meats marketed in California in 1976 and only 2 percent of the legs, claws and sections. Retail supermarkets and grocery stores purchased 67 percent of the in-shell products and only 8 percent of the meats. Table 3 shows the distribution of frozen Tanner crab by type of market and product form in Southern California.

Alaska production of canned and fresh/frozen Tanner crab meat has a firm domestic market primarily in coastal areas and most of Alaska sections are exported to Japan. Tables 3a and 3b show an estimated U.S. and Japan Tanner crab consumption by year, respectively.

Table 3. Percent of Distribution of Frozen Tanner Crab Categorized by Type of Market and Product Form 1975 and 1976

(Southern California)

		1975	1976
In Shell	Restaurants	0.3	2.0
	Retail outlets	88.4	67.6
	Intermediate distributors	11.3	30.4
	Total	100.0	100.0
Frozen Meat	Restaurants	11.6	36.2
	Retail outlets	9.5	8.1
	Intermediate distributors	78.9	55.7
	Total	100.0	100.0

Source: Orth, Frank et al., The Bering Sea Tanner Crab Resource: U.S. Production Capacity and Marketing, University of Alaska, 1977.

Table 3a Estimated U.S. Tanner Crab Consumpton

	Catch	Ex-vessel Price	Imports	Exports to Japan	Change in Frozen Holdings	Consumption
68	3,248	.10			NA	
69	11,207	.10			"	
1970	14,473	.10	16,269		"	30,742
71	12,880	.11	25,089	753	"	37,716
72	30,135	.12	18,467	175	"	48,427
73	61,719	.17	15,658	51,230	"	26,147
74	63,906	.20	13,492	28,779	"	48,619
75	46,857	.15	14,286	15,525	"	45,618
76	80,712	.20	10,555	36,799	-3,000	57,468

All quantities in thousand lbs. live weight.
Tanner crab conversion factors: section/live = .55; meat/live = .15

Source: Orth, Frank et al., The Bering Sea Tanner Crab Resource: U.S. Production Capacity and Marketing, University of Alaska, 1977.

Table 3b. Estimated Japanese Tanner Crab Consumption

	Catch	Ex-vessel Price	Imports from U.S.	Canned Exports	Inventory Change	Consumption	Catch of "Other" Crabs
68	135,978	48			NA		56,676
69	115,325	79			"		40,642
1970	117,428	09		11,613	"	105,815	41,998
71	93,369	117	253	21,373	"	72,249	67,672
72	91,998	115	175	10,700	"	81,473	59,705
73	73,592	179	51,230	933	"	123,889	84,762
74	66,284	184	28,779	3,367	"	91,696	121,392
75			15,525	2,947	"		
76			36,799		"		

All quantities in thousand lbs. live weight.
Tanner crab conversion factors: section/live = .55; meat/live = .15

Source: Orth, Frank et al., The Bering Sea Tanner Crab Resource: U.S. Production Capacity and Marketing, University of Alaska, 1977.

U.S. Tanner crab consumption has been increasing and one problem for the developing Tanner crab market is a shortage of domestic supply. The above study (Orth, Frank et al., 1977) further shows that most firms originally got into Tanner crab marketing to fill the Japanese demand for high quality products (frozen and sections). The domestic market started with the selling of the remaining sections and meat to the U.S. customers.

Ex-vessel price of Tanner crab is determined by negotiation at the beginning of the season. In Kodiak this price negotiation is carried out between the Fishermen's Association, the United Fishermen's Marketing Association, and the large processors.

The significant limiting factors for Tanner crab processing are the availability of raw crab, labor and housing for labor, frozen storage capacity, and the problem of transportation of finished products. For the Westward plants, the most important limiting factor is the problem of transportation. Most plants in Westward are floaters rather than shore-based plants and have limited cold storage facilities.

An average annual ex-vessel price for Tanner crab by management area can be seen in Tables A4 and B3. Consumption patterns and market channels for foreign countries can not be established because of lacking reliable data.

3.5.2. Domestic Commercial Harvesting Characteristics

See Table 4 and section 3.2.1.4. of each management area plan for a description of the vessels and gear participating within each management area's Tanner crab fishery.

TABLE 4 VESSEL CHARACTERISTICS OF ALASKAN TANNER CRAB COMMERCIAL FLEET

1976/77 SEASON (VALUES ESTIMATED BY AREA SHELLFISH BIOLOGISTS)

Management area	Number Vessels	Hold Capacity Per Vessel		Keel Length Mean		Keel Length Range		Net Tonnage Mean		Net Tonnage Range	
		Pounds	MT	Feet	M	Feet	M	Tons	MT	Tons	MT
SOUTHEASTERN:											
Southeast	30	94,200	42.7	80	24.4	32-103	9.8-31.4	107	97	23-197	21-179
Yakutat	6	24,000	10.9	49	14.9	32-85	9.8-25.9	30	27	5-67	5-61
PRINCE WILLIAM SOUND	23	23,000	10.4	52	15.8	26-82	7.9-25.0	34	31	4-147	4-133
COOK INLET	66	38,000	17.2	50	15.2	27-92	8.2-28.0	37	34	5-146	5-132
KODIAK	98	39,000	17.7	56	17.1	30-134	9.1-40.8	50	45	4-198	4-180
S. PENINSULA/ ALEUTIAN:											
S. Peninsula	42	50,000	22.7	65	19.8	34-112	10.4-34.1	68	62	11-198	10-180
Aleutian	9	170,000	77.1	86	26.2	78-108	23.8-32.9	139	126	111-199	101-181
BERING SEA	66	170,000	77.1	93.6	28.5	58-158	17.7-48.2	140	127	40-281	36-255

3.5.2.1. Total Gross Income of the Tanner Crab Fleet from Subject Fishery and All Other Fisheries, and Average Per Fleet Unit.

Statewide, the total gross income for Tanner crab fisherman from all fisheries that they participated in (King crab, salmon, Tanner crab, etc.) was $74,800,000 in 1976. The average income per vessel was $190,000.

Tanner crab ex-vessel value, total gross income of the fleet, and gross income per vessel for each management area in 1976 is shown in Table 5.

TABLE 5. VALUE OF TANNER CRAB CATCH AND TOTAL GROSS INCOME (all fisheries) FOR FLEETS BY MANAGEMENT AREA, 1976[1]

MANAGEMENT AREA	TANNER CRAB VALUE ($)	TOTAL GROSS INCOME ($)	AVERAGE GROSS INCOME PER VESSEL ($)
Southeastern	772,536	3,408,467	121,731
Pr. Wm. Sound	1,200,089	2,186,800	86,072
Cook Inlet	1,246,413	7,314,994	101,597
Kodiak	4,924,284	10,448,790	175,703
S. Pen./Aleutian	3,560,162	13,078,715	155,699
Bering Sea	4,353,276	30,362,900	460,044
Total	16,056,760	74,800,074	190,849

1/ Annual (not seasonal) values.
Vessel assigned to area with largest Tanner crab landing.

Source: Commercial Fisheries Entry Commission

3.5.2.2. Investment in Vessels and Gear

During the 1976-77 Tanner crab season 339 vessels, fishing approximately 40,000 pots, participated in the fishery. There are no data currently available to estimate the total investment in capital equipment. Some vessels involved in this fishery have a current market value as small as a few thousand dollars, while others are worth well over one million dollars. However, given a current approximate value of a Tanner crab pot with buoy and line of $400, it can be estimated that with 40,000 pots in the 1976-77 fishery, fishermen have an investment of $16,000,000 in pots alone.

A major research effort is being conducted by the Alaska Commercial Fisheries Entry Commission, under NMFS funding, to develop an economic profile of the shellfish fisheries. A component of this research will be an estimate of the total investment in capital equipment. Upon completion of this study, data will be available to provide an estimate of investment directed towards each Tanner crab fishery.

3.5.2.3. Annual Participation in the Tanner Crab Fishery

During 1976, 394 vessels made 3,743 landings for which individual fish tickets were issued. There is currently no data available to develop summary statistics in terms of standardized vessel days or pot lifts. However, where possible (see sections 3.5.2.3. within the various management area sections of this plan), estimates of participation have been made by the area shellfish biologist based upon his familiarity with the activities of the fleet.

3.5.2.4. Total Employment in the Tanner Crab Fishery Harvesting Sector

Statewide summary statistics for employment in the Tanner crab harvesting sector are not available. There is currently no state of Alaska or Federal agency collecting employment data on an annual basis which is discrete enough to break out employment by species. The Alaska Department of Labor does publish employment statistics quarterly by major industrial classification. However, the source of this information is the employer's contribution report for unemployment insurance, and therefore does not reflect total employment nor can the employment be related to species. Area shellfish biologists have provided an estimated total fishing employment of 1,183 during the 1976-77 season (see Table 6).

TABLE 6. POTENTIAL HARVESTING AND PROCESSING CAPABILITIES IN THE ALASKAN COMMERCIAL TANNER CRAB FISHERIES, 1976/77 SEASON

(Values Estimated By Area Shellfish Biologists)

	HARVESTING SECTOR							PROCESSING SECTOR					
MANAGEMENT AREA	[illegible] VESSELS	CREW	[illegible] POTS	FLEET LIVE TANK CAPACITY 10^6 lbs	MT	SEASONAL TANK CAPACITY 10^6 lbs	MT	[illegible] PLANTS	[illegible] EMPLOYED	DAILY PROCESS CAPACITY 10^6 lbs	MT	SEASONAL PROCESS CAPACITY 10^6 lbs	MT
Southeastern													
Southeast	30	90	[illegible]	0.72	327	8	3730	9	[illegible]	0.20	90.7	[illegible]	13608
Yakutat	6	[illegible]	900	0.57	256	5	2029						
Prince William [illegible]	23	72	[illegible]	0.52	237	11	4800	3	175	0.11	47.7	20	9072
Cook Inlet	66	231	5000	2.50	1134	[illegible]	17,237	4	250	0.20	90.7	30	[illegible]
[illegible]	[illegible]	[illegible]	9000	3.78	1716	[illegible]	17,237	17	[illegible]	1.35	[illegible]	162	73440
S. Peninsula/ Aleutian													
S. Peninsula	42	126	5200	2.11	955	[illegible]	[illegible]	3	225	0.13	56.7	[illegible]	11057
Aleutians	9	36	[illegible]	1.53	694	28	12,474	[illegible]	[illegible]	[illegible]	[illegible]	135	61236
Bering Sea	66	[illegible]	[illegible]	11.22	5089	135	61,055	17	1505	1.20	544.	[illegible]	[illegible]
TOTAL	340	1183	40740	22.95	10408	307	138,628	67	5225	4.09	1849.8	581	263669

3.5.2.5. Economic Viability

To specify the economic condition of this fishery as an average net return over the whole fleet, or by appropriate subcategories of vessels, within the fleet, several kinds of data are required. In addition to the gross income from this fishery and all other fisheries in which these vessels participate (most are multi-product firms), cost of production information is required as well as the development of an analysis of the production function. Further, in order to determine how efficient the firms are, estimates of least cost production and maximum potential net returns must be derived and compared with current earnings. This requires estimating maximum sustainable economic yield (MSEY). To estimate MSEY requires a biological yield function, product demand curves, production function analysis and input costs. Currently most of this information is not available. Again, there are research efforts in progress which should provide quantitative data for several of the parameters in the system. These studies include those being conducted by the Commercial Fisheries Entry Commission, University of Alaska and Sea Grant.

3.5.3. Domestic Commercial Processing Characteristics

3.5.3.1. Total Gross Income of Area Processors

In 1975, Tanner crab processors realized a gross income (at first wholesale level) of $19,372,377 from Tanner crab (ADF&G 1975 Catch and Production Leaflet). At this time there are no summary statistics providing the total gross or average income received by processors combining all species.

3.5.3.2. Investment in Plant and Equipment

There are no summary statistics available on processor's investment in capital.

3.5.3.3. Total Employment and Labor Income

Employment statistics related to the processing of Tanner crab are not available nor is total annual employment by these firms. However, area shellfish biologists have estimated employment in the processing of Tanner crab during 1976-77 to be 5,225 (see Table 6).

No statistics on total labor income related to processing of Tanner crab are available.

3.5.3.4. Economic Viability (Net Income and Efficiency)

There is currently no information available related to the profitability of processing Tanner crab. Data required to address this question are similar to that needed for the harvesting sector. However, with respect to the economic activities of the processing

firms there are no known studies underway which will provide data for this sector of the industry.

3.5.4. and 3.5.5. Recreation and Subsistence Fishing Characteristics

There is no Tanner crab fishery in Alaska which is defined or regulated as a recreational fishery. There is, however, a "subsistence" fishery which for many subsistence fishermen represents a recreational activity. Currently, there are no data relative to the number of man days of participation in the subsistence Tanner crab fishery, the quantity of gear used or the catch.

3.5.6. Indian Treaty Fishing Characteristics

There are no Indian treaty rights associated with the Alaskan Tanner crab fishery.

3.5.8. Area Community Characteristics

3.5.8.1. Total Population

Alaska's 1976 population statistics show the state as having a population of 413,289. (Department of Labor 1977). Table 7 provides population by management area.

TABLE 7. TOTAL RESIDENT POPULATION (CIVILIAN & MILITARY) BY AREA AND YEAR

	1960	1970	1971	1972	1973	1974	1975	1976
Statewide	226,167	302,361	311,070	322,115	330,365	351,159	404,634	413,289
S.E.	35,403	42,565	43,088	44,475	46,417	50,232	[illegible]	51,172
P.W.S.	7,559	7,291	7,440	7,696	7,996	8,476	14,791	18,748
C.I.*	6,079	14,250	14,204	13,830	13,800	13,962	15,621	16,753
Kod.	7,174	9,409	9,665	8,645	[illegible]	9,232	[illegible]	9,360
S. Pen.	6,011	8,057	7,849	7,197	6,914	7,714	7,086	8,282
Ber.Sea	4,024	4,632	4,202	4,663	4,858	5,114	5,761	4,752

* Exclusive of Anchorage

Source: Alaska Dept. of Labor, Employment Security Division

3.5.8.2. Total Employment

Third quarter 1976 statistics (Department of Labor section 3.5.2.4) show that total employment in seafood processing and in fishing were 7,772 and 1,734 respectively. Employment data are not available for fishery related secondary employment statewide. Where possible, estimates of employment have been made within the management area sections of this plan. Employment statistics, including rates of unemployment from first quarter 1974 to third quarter 1976 are given in Table 8.

TABLE 8. STATEWIDE EMPLOYMENT STATISTICS.*

		ALL INDUSTRIES				SEAFOOD PROCESSING				FISHING			
Year & Quarter	State Pop.	Number Employed	% Un-Employed	Average Monthly Wage	Total Payroll	Number Employed	% Un-Employed	Average Monthly Wage	Total Payroll	Number Employed	% Un-Employed	Average Monthly Wage	Total Payroll
76-3	413,289	189,519	[illegible]	$ 2166	$ 1,118,496,672	7772	6.5	$ 1100	$ 25,675,008	1734		$ 1944	$ 10,113,228
76-2		176,010	8.1	1800	[illegible]	4700	11.7	901	13,459,074	830		1535	3,821,500
76-1		166,099	11.6	1573	[illegible]	2995	16.3	832	7,304,619	672		[illegible]	2,512,966
75-4		167,970	8.1	1702	886,010,790	3725	12.2	863	9,644,259	812		1977	4,816,387
75-3	404,634	179,020	5.6	1720	908,800,223	6413	5.3	885	17,051,541	1800		1194	[illegible]
75-2		[illegible]	8.8	1538	730,301,730	3533	16.3	660	7,621,211	730		1049	2,299,295
75-1		136,424	11.6	1488	807,370,666	1670	30.3	804	4,633,361	800		1164	941,051
74-4		157,730		1801	[illegible]	3870		960	[illegible]	706		1773	3,865,040
74-3	351,160	142,000		1252	536,563,520	6870		844	15,395,046	1500		1695	[illegible]
74-2		126,136		1115	[illegible]	4000		750	9,145,777	630		1535	[illegible]
74-1		105,951		1029	327,107,657	2704		622	5,125,670	500		1166	[illegible]

* Significant excluded segments: self-employed persons, unpaid family help, domestic, and most persons employed in agriculture.

Source: "Statistical Quarterly" Alaska Dept. of Labor, Employment Security Division

3.5.8.3. Total Work Force

Third quarter 1976 employment stood at 189,519 with an unemployment rate of 5.9 percent for all industries within the State of Alaska. Total payroll for that same period was $1,118,496,072, with an average of $2,166 per/mo. Seafood processing employed 7,772 persons receiving an average wage of $1,100 per/mo. for a total payroll of $25,675,008. Unemployment in seafood processing was slightly higher than for all industries, at 6.5 percent. In the fishing sector 1,734 persons received an average monthly wage of $1,944, resulting in total payroll of $10,113,228. Unemployment rates for fishing are not available. Table 8 provides employment and payrolls for all industries, seafood processing, and fishing from the first quarter 1974 through the third quarter 1976.

3.6. INTERACTIONS AMONG USER GROUPS

There are three distinct users of the Tanner crab resource in Alaska; domestic commercial fishermen (both Alaska residents and non-residents), subsistence fishermen, and commercial fishermen who are Japanese nationals. There is essentially no conflict between domestic commercial and subsistence Tanner crab fishermen and there has been no attempt to develop regulatory methods to allocate the resource between the two users. There are conflicts however, between foreign commercial and domestic commercial users of the resource

in terms of competing for the crab on the same fishing grounds. As a result, regulations have been developed to allocate the resource between the two users and to reduce gear conflicts. (Refer to sections 3.3.3. and 8.2.3. and see the 1977 Tanner crab PMP).

3.7. FEDERAL AND STATE REVENUES DERIVED FROM FISHERY

Table 9 provides information on revenues derived by the State of Alaska from fish taxes and the sale of permits and licenses from 1969 to 1976. However, only the processors taxes and the Commercial Fisheries Entry Commission's permits can be directly linked to Tanner crab. These two sources accounted for $101,752 in 1975. Revenues derived from other taxes, such as personal Federal and State income taxes associated with net earnings in the Tanner crab fishery, are not available.

TABLE 9. STATE REVENUES RELATED TO TANNER CRAB

	1969	1970	1971	1972	1973	1974	1975	1976
1/ Processor Taxes	$ 11,689	20,362	17,162	36,985	113,399	132,145	73,357	N.A.
2/ C.F.E.C. Permits	$ --	--	--	--	--	108,360	28,395	14,710
3/ Processor licenses	$ 500	500	400	875	1,225	1,100	825	1,675
4/ Com. Fish licenses	$315,630	375,240	334,400	346,520	358,130	325,020	334,510	391,550
5/ Vessel licenses	$146,898	161,863	156,490	156,624	164,194	152,486	158,704	163,180
6/ Gear Pot licenses	$ 17,430	18,225	14,415	17,685	29,025	35,445	28,875	31,410

Source: Alaska Dept. of Revenue; except C.F.E.C. permits are from Commercial Fisheries Entry Commission

1/ Taxes are for Tanner crab industry.
crab canneries - - 2% of raw crab value
shore-based fish processors - - 1% of raw fish value
floating fish processors - - 4% of raw fish value

2/ Commercial Fisheries Entry Commission - table values are specific to Tanner crab fishery.
pot gear for vessel length 50 ft. or less - -$50.
" " " " more - -$100.
except for poverty income levels - -$5.

3/ General licenses not specific to just Tanner crab - -$25. per facility

4/ & 5/ Table values apply to all fisheries - -i.e. not specific to Tanner crab
$10 resident, $30 nonresident

6/ Table values apply to all types of shellfish pots - -i.e. not specific to Tanner pots.
100 pots or less - $15 resident, $45 nonresident
each additional 100 pots - $15 resident, $45 nonresident

Federal revenues from the foreign industry and fishing fleet are based on a system of permits and taxes: 3.5 percent tax based on ex-vessel value of the harvest ($441 per metric ton for Tanner crab); $1 per gross ton of fishing vessels; $0.50 per gross ton of processing vessels up to $2,500; $200 per support vessel (transport, water, fuel, etc.). Total revenue statistics for the 1977 Japanese Tanner crab fishery are:

Ex-vessel value tax	$193,000
Fishing vessels	10,776
Processing vessels	6,377
Support vessels	N/A
Total	$210,153

Source: NMFS—Juneau, Alaska.

4.0. BIOLOGICAL DESCRIPTIONS

4.1. AND 4.2. GENERAL LIFE HISTORY AND STOCK UNITS

Taxonomy. The Tanner crab is a member of the brachyuran crabs or true crab. Garth (1958) has described the taxonomy as:

Class: Crustacea;
Sub-class: Malacostraca;
Order: Decapoda;
Sub-order: Brachyura;
Super-family: Oxyrhyncha;
Family: Majidae;
Sub-family: Oregoniinae;
Genus: *Chionoecetes.*

The genus of *Chionoecetes* actually consists of two polytypic species, *C. opilio* and *C. angulatus. C. opilio* may have given rise to *C. opilio elongatus* and *C. bairdi;* while *C. angulatus* may have given rise to *C. tanneri* and *C. japonicus* (Garth 1958).

Common names associated with species of this genus include "Tanner crab", "snow crab" and "queen crab". The name "Tanner" is most commonly used in Alaska. Its origin is related to Lt. Commander A. L. Tanner, commander of the Bureau of Fisheries' steamer Albatross, whose exploration produced the early records of this genus. Snow crab is the official trade name for these species.

Distribution. The genus has a circumarctic distribution, extending into the temperate waters on the east and west coast of North America and Eurasia. Garth (1958) has described the geographic and depth distribution (Table 10).

TABLE 10. CHIONOECETES spp. AND THEIR DISTRIBUTION

SPECIES	(METERS)	(FATHOMS)	GEOGRAPHIC DISTRIBUTION
C. opilio (O. Fabricius)	13-454	7-248	Bering Sea, Arctic Ocean, North Atlantic Ocean from west coast Greenland to Casco Bay, Maine
C. elongatus Rathbun	to 2222	to 1215	Sea of Japan, Okhotsk Sea
C. bairdi Rathbun	shoalwater to 474	shoalwater to 259	Bering Sea to California (Hosie and Gaumer 1974)
C. tanneri Rathbun	53-1942	29-1062	Washington to lower California
C. angulatus Rathbun	90-2972	49-1625	Bering Sea to Oregon
C. japonicus Rathbun	411-2103	225-1150	Sea of Japan (Watson 1969; Fukataki 1965)

C. japonicus is the only species not found in the eastern Pacific. *C. opilio* has the widest geographic distribution, it occurs in the Sea of Japan and the Okhotsk Sea where it is classed as the subspecies *C. opilio elongatus*, north through the Bering Sea and into the Chukchi Sea and south into Central Alaska. *C. opilio* also occurs in the North Atlantic as far south as Casco Bay, Maine.

Three species of this genus have been reported from Alaskan waters. *C. bairdi* and *C. opilio* are encountered on the continental shelf to a depth of 473 meters (259 f) and 454 meters (248 f) respectively. *C. angulatus* occurs most frequently at greater depths and has been recorded at depths to 2972 meters (1625 f). Of the three species occurring in Alaskan waters, two, *C. bairdi* and *C. opilio*, are commercially harvested, with *C. bairdi* comprising 90–95 percent of the catch. Off the coasts of Washington and Oregon, *C. tanneri* is the dominant species with *C. bairdi* and *C. angulatus* present. *C. tanneri* would probably be the target species if a fishery began. *C. opilio elongatus* is harvested in the Sea of Japan. *C. opilio* has been harvested by Japanese and Russian fishermen in the Bering Sea and by Canadians in the northwest Atlantic.

Adult Tanner crab are intolerant to and restricted in their distribution by low salinities and high temperatures. Laboratory experiments in Canada have demonstrated that *C. opilio* will die within 24 hours if kept in salinities less than 22.5 0/00. At salinity of approximately 31 to 32 0/00 McKeese (1968) determined that *C. opilio* reaches the 50 percent mortality point after 18.8 days when held at 16 degrees C. Thus it is reasonable to expect that the southern range of Tanner crab distribution may be limited if water temperatures exceed 16° C. (61° F).

Size at Sexual Maturity. The attainment of sexual maturity for Tanner crab is accompanied by characteristic changes in external morphology which are acquired at the molt to maturity. The molt to maturity for males includes a disproportionate increase in the growth of the chelae in relation to the carapace. This change is not always visually evident. Individual males with mature gonads do not always display large chelae and crab which have completed the puberty molt are not always physiologically mature (vasa deferntia does not contain large numbers of spermatozoa enclosed in spermatophores. Brown and Powell 1972; Watson 1970). The method of allometry (the growth of an organ in relation to the rest of the body) has been used to predict the average size at maturity for males and seems to approximate the state of physiological maturity as well.

Research studies conducted in the Kodiak management area by Donaldson, in the Bering Sea by Somerton, and in Prince William Sound by Hilsinger have concluded little difference between the areas of average size at sexual maturity for male (110–115 mm) and female (83 mm) Tanner crab. Commercial catch sampling from all management areas shows size variation between the catch in different areas to be negligible in male Tanner crab.

The molt to maturity for females is much more evident. It is accompanied by characteristic change in the shape and size of the abdominal flap (sternum) and pleopods. Hartnoll (1969) states that it is very exceptional for females to copulate prior to the molt to puberty and this molt can therefore be regarded as reliably indicating the onset of maturity. Female Tanner crab display a large size range at which the puberty molt occurs suggesting that maturity is not associated with a specific age or molt class but is variable.

Growth and Age. Crustaceans grow by shedding the exoskeleton (ecdysis). The term molting has been used to include all the processes of preparation for withdrawal from the old integument, ecdysis and post-ecdysis, increase in linear size, as well as subsequent tissue growth (Passano 1960). The intervals between molts increase with age and growth and often vary between populations of crab. All hard parts are cast off during ecdysis leaving no visible aging technique such as annual growth rings as aids to age determination. Estimation of age therefore is very difficult.

Male and female *C. bairdi* have similar growth rates until they approach sexual maturity. The females undergo a terminal molt at the molt to maturity. No further growth occurs (Hartnoll 1969; Holsinger 1975). The male continues to grow; however, the inter-molt period may increase "skip-molt" (Donaldson 1975a). Males may reach a point where growth ceases. This has been found for *C. opilio* in the northeast Atlantic (Miller and Watson 1976).

Knowledge of the age-size relationship is necessary for identifying prerecruit crab by year class and determining the number of year classes in the fishery, length of time in the fishery and growth rate. Figure 2 gives the results from studies in the Kodiak area.

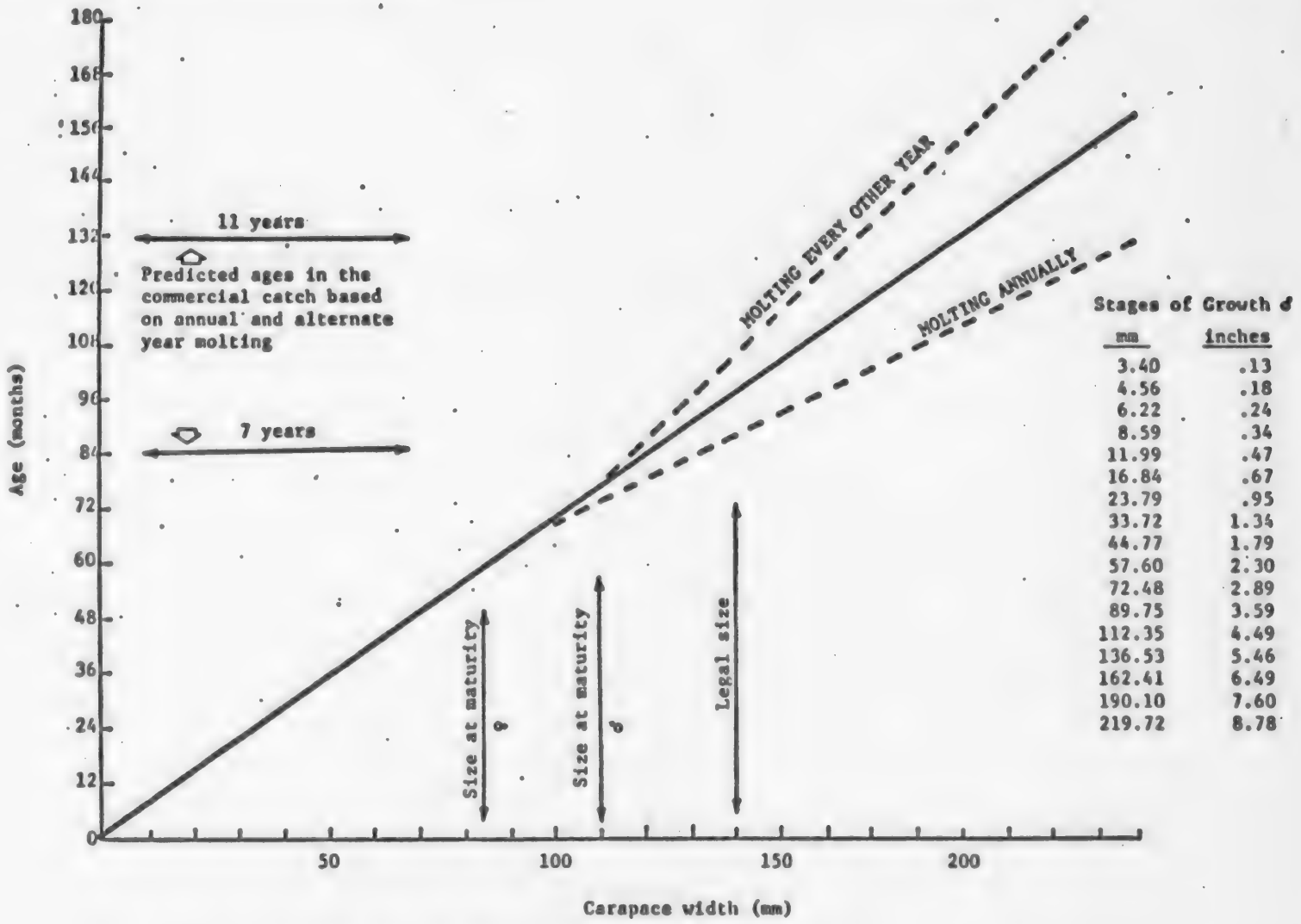


FIG. 2 Tanner crab (C. bairdi) growth model

Source: Kodiak Alaska Tanner Crab C. bairidi Research Completion Report 1/77 William Donaldson

Reproduction. Female Tanner crab mate for the first time at the molt to maturity. Females are attended by a male during the molting process and are mated in the soft shell condition. The attraction of the male to the female is accomplished by a pheromone (chemical attractant) released by the female. Female brachyuran crabs have the ability to store sperm in the spermathecae which is used to fertilize successive egg clutches in the absence of a male. It is presently not known how many egg clutches can be fertilized by one mating. If a female is unattended by a male at the molt to maturity, she will not ovulate (Donaldson 1975).

Courtship and mating behavior has been documented for *C. opilio* (Watson 1970) and *C. bairdi* (Donaldson 1975) and is similar for both species.

Primiparous females of *C. bairdi* mate and deposit egg clutches from mid-winter to early spring while multiparous females hatch clutches and deposit new eggs in the spring. Egg development is slowed in the primiparous females and coincides with that of the multiparous females. Spring egg hatch is then sychronized to spring food availability. This is also the situation with *C. opilio* (Watson 1970) and *C. opilio elongatus* in the Sea of Japan (Ito 1967).

There has been much discussion concerning mating beyond the initial copulation at the molt to maturity (last molt for females) in the Majidae. There are records of species in the family Majidae mating while the female is soft in some instances and hard in other (*Hayas coarctatos* Leach and *Maja squinoda* Herbst) while other species have been observed mating only while hard (Hartnoll 1969). Literature dealing with the Majidae (Carlisle 1957, Knudsen 1964, Yoshida 1941 and Hilsinger 1975) supports the hypothesis that the molt to maturity is a terminal molt for females. "Those females seen mating when soft must have been doing so for the first time, immediately following the molt of puberty. Any further copulations must of necessity occur when the females are hard" (Hartnoll 1969). It has been observed that hardshell females of *C. opilio* and *C. bairdi* are capable of producing fertile egg clutches with sperm stored in the spermathecae, in the absence of males. Watson states that mating in the hardshell condition for *C. opilio* is rare or nonexistent. Research biologists have documented a mating involving an oldshell adult female. (Donaldson 1977)

The number of eggs a female can carry has been described as a linear function of her carapace width (Kon 1974, Hilsinger, 1975). Fecundity estimates are listed below (after Somerton, unpublished data).

Fecundity estimates for *Chionoecetes* spp.

Species	Egg Number × 1000	Carapace Width (mm)	Reference
C. opilio.....	20–140	50–90	Watson 1969, Gulf of St. Lawrence
C. opilio elongatus.	34–138	57–90	Kon 1974, Sea of Japan
C. bairdi.....	85–231	78–110	Hilsinger 1975, Gulf of Alaska
	89–424	75–124	Haynes et al. 1976, Bering Sea

Male Tanner crab are capable of participating in mating at the size at which they reach maturity (Donaldson 1975). Watson (1972) reported that a male *C. opilio* fertilized six females.

Seasonal distribution by depth for mating purposes has been described for *C. tanneri* (Pereyra 1966, 1968) and *C. opilio elongatus* (Kon 1969). With both species there seems to be a demonstrated segregation by size and sex (large males with old adult females, small males with new adult females) for breeding purposes.

The mating season is composed of three significant events: (1) molt to maturity and mating of primiparous females, (2) peak of egg hatch, (3) deposition of new egg clutch by multiparous females. Management strategy must incorporate these factors to ensure the reproductive vigor of the populations. Monitoring the percent of egg-bearing (ovigerous) females is an important management tool in a male-only fishery to ensure an adequate male-female ration by size for reproductive purposes. Hatching of the eggs (larval release) appears to coincide with the plankton blooms. The free-swimming larvae molt and grow through several distinct stages before settling to the bottom as juveniles where they cover themselves with debris and begin feeding on detritus. The growth rate from larval to juvenile stage is dependent upon water temperature, with warmer temperatures producing faster growth. At water temperatures of 11 to 13° C (52 to 55° F) the free-swimming developmental period between the larval and juvenile stages may last approximately 63 days for *C. opilio* (Kon 1970).

Plankton studies in the Sea of Japan indicate that the free-swimming larvae of Tanner crab undergo diurnal vertical migrations. The migration is a feeding response to the diurnal movements of plankton blooms.

Predation. Adult Tanner crab appear to have few predators, although it is likely that during molting they may be vulnerable to large fish and perhaps larger crustaceans such as king crab.

Migrations. Pereyra (1966) reported that the population structure of *C. tanneri*, male and female, changes quite dramatically with depth. From Washington to California "Females are fairly stationary, with the apparent abundance of the population centered between 640 and 686 meters (350 and 375 f). In contrast, the males are quite migratory and exhibit a seasonal movement pattern that repeats itself for all years studied. In the spring and summer the population of males in centered at 503 to 549 meters (275 to 300 f), but as winter approaches the entire male group shifts downward and occupies the same depth interval as the females. Following a short period of aggregation with the female group, the males return to the shallower environment, separating the sexes again". The timing of intermingling of the sexes and egg release and ovulation coincide so as to strongly suggest that the movement of adult males is a prerequisite to breeding and can therefore be referred to as a breeding migration. Kon (1970) describes a migration pattern for *C. opilio elongatus* similar to that described for *C. tanneri* with segregation by size group and migrations for reproduction. Somerton (unpublished) has described segregation by size groups for *C. bairdi* in the Bering Sea while vertical migrations were not as obvious.

4.3. CATCH AND EFFORT DATA

The catch and effort data is presented in each management area section of this plan and Table 1, p. .

4.4. SURVEY AND SAMPLING DATA

Annual quantitative crab indexing surveys were initiated by the Alaska Department of Fish and Game in 1972 around Kodiak Island. The survey area has expanded to include the Adak, Dutch Harbor, Sand Point, Kodiak, Cook Inlet and Prince William Sound areas. Data gathered allow fishery managers to assess: (1) the relative abundance of the various size/maturity group; (2) percent ovigerity; (3) the effects of the commercial fishery upon the population; and (4) optimum harvest levels in advance of the commercial fisheries. The surveys are conducted utilizing State of Alaska research vessels and chartered crab fishing vessels.

National Marine Fisheries trawl surveys in the eastern Bering Sea allow assessment of those parameters for *C. bairdi* and *C. opilio.*

4.5. HABITAT

There is very little published material covering the habitat and distribution of juvenile Tanner crab. Exploratory work in the Sea of Japan indicated that juveniles settle out along the sea bottom at depths between 298 and 349 meters (163 to 349 f) (Ito 1968). Alaska Department of Fish and Game biologists in Kodiak, using scuba gear, have collected juvenile *C. bairdi* as small as 6.5 mm in 18 meters (10 f). The National Marine Fisheries Service has records of juvenile Tanner crab as small as 12 mm caught in shrimp trawls off Kodiak in 55 to 146 meters (30 to 80 f). This information suggests that distribution of juvenile Tanner crab is widespread. The actual diet of the juveniles is uncertain, but they are believed to feed primarily on dead and decaying mollusks and crustaceans which accumulate in the detritus along the sea floor. Fish remains and small planktonic organisms are also utilized.

4.6. QUALITY OF DATA

The management of the domestic Tanner crab fishery is primarily based on commercial catch monitoring which includes fishermen interviews, catch sampling, and catch per unit effort data obtained from fish tickets. The quality of this data is considered adequate for all management areas with exception of Southeastern where catch per pot lift needs to be determined.

The life history features of Tanner crab have been studied primarily in the Prince William Sound, Kodiak, and Bering Sea areas. Data from these areas has been assumed applicable to other populations in the State.

Estimates of size at sexual maturity for both sexes and female ovigerity are documented in the literature. Research concerning the reproductive scheme and periods of molting by size class are recent and require additional work. The duration and timing of fishing seasons is therefore based on available knowledge. Size at sexual maturity for males has been documented by Somerton (1977) and Donaldson (1977) at 4.3-4.5 inches (110–115 mm).

The Board of Fisheries set a statewide size limit of 5.5 inches (140 mm) (except Prince William Sound where it is 5.3 inches (135 mm) which would protect nearly all newly mature male crab, believing that manipulation of annual harvest of newly matured males was not adequate to protect the stock from overfishing.

The Board's size limit of 5.5 inches (140 mm) is a conservative approach. Somerton examined the possibility of alternate size

limits and theorizes what harvest could be expected from lower size limits. Observation over time of the effect of harvesting males of various sizes on the reproductive potential of the stocks will be required to adequately evaluate the degree of protection required.

The degree of female ovigerity is used in all areas as an indicator of reproductive potential and is closely monitored. The observation of non-ovigerity in the population could mean an over harvest of newly matured or older age classes of males.

Inadequate life history features for which more information is needed to manage the fishery are distribution, age class identification based on shell characteristics, natural mortality, and mating characteristics of old shell females.

The identification of stock units within management areas is not defined and studies are needed in all areas of the State.

Population abundance surveys are presently being conducted in the Bering Sea by NMFS. Relative population abundance surveys are being conducted by ADF&G in all other management areas, except Southeastern. The data collected in the Bering Sea is presently being used to manage the population while in other areas, the data base is too limited to quantitatively forecast recruit abundance. More information on population abundance is required for all management areas.

4.7. CURRENT STATUS OF STOCKS

4.7.1. *Maximum Sustainable Yield*

Data on stock abundance and resultant harvest levels are not available for this developing fishery with which to estimate maximum sustainable yield by stock with any degree of precision. The estimates presented in Table 11 are derived from recent average harvests and trends and serves only as a first approximation against which to judge acceptable biological catch and optimum yield.

Exception to this situation occurs in the Bering Sea where National Marine Fisheries Service Trawl survey data have allowed an estimate of maximum sustained yield for *C. bairdi* and OCS surveys permit an MSY estimate for *C. opilio*. Again, these estimates of stock abundance, while better than for other areas, are over a relatively short period of time and may not truly reflect the potential long-term maximum average sustainable yield from this fishery.

4.7.2. Equilibrium Yield

Data are not available at this time for any of the management areas to derive estimates of equilibrium yield. Potential variation in natural stock abundance is unknown.

4.7.3. Acceptable Biological Catch (ABC)

In the absence of forecasts of annual recruitment for most areas acceptable biological catch has been based on recent harvest trends of male crab over 5.5 inches (140 mm) carapace width (Prince William Sound 5.3 inches (135 mm). Due to the lack of definitive information on stock abundance, inseason flexibility of management is desirable, and these catch levels serve simply as a guideline to industry and fishermen of the general harvest level to be expected. In terms of the Act, they also serve as the basis for optimum yield and the further determination of whether there should be any foreign allowable catch. One exception to this is for the Bearing Sea where MSY and ABC estimates in a more refined fashion are available based on trawl survey results. Table 11 gives the ABC compared to MSY for each of the management areas discussed in this plan.

4.8. ESTIMATE OF FUTURE STOCK CONDITION

The outlook for Tanner crab is summarized by management areas as follows:

Bering Sea: Healthy stock condition capable of supporting current production is indicated by the available survey and harvesting data.

South Peninsula/Aleutian: Healthy stock condition is indicated by available survey and harvesting data.

Kodiak: Healthy stock condition capable of supporting current production levels is indicated by the available data.

Prince William Sound: Healthy reproductive stock condition. Harvestable stocks should recover from present low levels and be capable of supporting MSY in the future.

Cook Inlet: Healthy stock condition is indicated by the available data. A relatively weak recruit year class appears to be entering the Kachemak Bay fishery.

Southeastern: Healthy stock condition is indicated by available harvest data.

5.0. CATCH AND CAPACITY DESCRIPTORS

See Table 6 and area management sections for detailed analysis.

6.0. OPTIMUM YIELD

In the absence of any socio-economic objectives which would require a specification of OY to deviate from ABC, optimum yield is set equal to ABC, with the exception of the Bering Sea (see section F.6.0.). It should be noted that the ABC does, to some degree, reflect social and economic considerations since it has been based partially on achieving stability in the fishing industry. Additionally, the Prince William Sound management area's 5.3 inch (135 mm) size limit instead of the 5.5 inch (140 mm) size limit common to the rest of the state was adopted to reduce the economic dislocation of the fleet in this area which was already operating on smaller sized crab than in other areas. Optimum yields by management area are given in Table 11.

TABLE 11.—*Alaska Tanner crab domestic annual capacity of fleet (DAC), processing capacity, maximum sustainable yield (MSY), acceptable biological catch (ABC), optimum yield (OY), expected domestic annual harvest (DAH), and foreign allowable catch (FAC) by management area for the 1977–78 season.*

	DAC		Processing capacity		MSY		ABC		OY		DAH		FAC	
	10⁶ lbs	MT	10⁶ lbs	MT	10⁶ lbs	MT	10⁶ lbs	MT	10⁶ lbs	MT	10⁶ lbs	MT	10⁶ lbs	MT
Southeastern:														
Southeast	8	3,739	30	13,608	2.5	1,134	2.5	1,134	2.5	1,134	2.5	1,134	0	0
Yakutat	5	2,029	30	13,608	3	1,361	3	1,361	3	1,361	3	1,361	0	0
Prince William Sound	11	4,808	20	9,072	7.1	3,266	3-7	1,361-3,175	3-7	1,361-3,175	3-7	1,361-3,175	0	0
Cook Inlet	38	17,237	30	13,608	5.3	2,404	5.3	2,404	5.3	2,404	5.3	2,404	0	0
Kodiak	38	17,237	162	73,440	21.5	9,752	15-25	6,804-11,340	15-25	6,804-11,340	15-25	6,804-11,340	0	0
South Peninsula/Aleutian:														
South Peninsula	44	20,040	24	11,057	20	9,072	20-30	9,072-13,608	20-30	9,072-13,608	20-30	9,072-13,608	0	0
Aleutian	28	12,474	135	61,236	2	907	2	907	2	907	2	907	0	0
Bering Sea:														
C. bairdi	135	61,055	180	81,648	89	40,381	89	40,381	89	40,381	89	40,381	0	0
C. opilio:														
S. of 58° N. Lat.					225.0	102,000	225.0	102,000	22.04	10,000	22.04	10,000	0	0
N. of 58° N. Lat. and W. of 164° W. Long.					225.0	102,000	225.0	102,000	36.06-38.06	16,360-17,268		1,360-2,268	13.06	15.0

*A minor portion of this allocation of Tanner crab may be comprised of *C. bairdi* and hybrids.

**Foreign fishing for Tanner crab is prohibited south of 58° North Latitude to protect the stocks of *C. bairdi* which will be fully utilized by the U.S. fishery.

7.0. TOTAL ALLOWABLE LEVEL OF FOREIGN FISHERY (FAC) FOR 1978

Portion of optimum yield available for foreign harvest. In a rapidly developing fishery, such as for Tanner crab in Alaska, there may be areas where the total harvestable surplus is not taken in a given year due to price negotiations, market conditions, or annual variations in the availability of processing and harvesting facilities. In fisheries where this is only an occasional occurrence, and where MSY and ABC are imprecisely defined, this may not be a predictable circumstance and will not justify any preseasons allocation to foreign fishermen. Such allocation would simply preclude further development of the U.S. industry. Similarly, where natural fluctuations in stock abundance are extreme and not completely defined, occasional surpluses beyond the U.S.'s ability to harvest should not be the basis for foreign allocation. Based on these considerations, no portion of the *C. bairdi* optimum yield for the 1978 fishing season is available for foreign harvest. The U.S. industry expects to harvest the optimum yield of this species and foreign fishing would compete directly with the U.S. industry's desire to expand its harvest of *C. bairdi* in the U.S. Fishery Conservation Zone.

8.0. MANAGEMENT REGIME

8.1. MANAGEMENT OBJECTIVES

Within the guidelines provided in the Act and the goals and objectives stated in section 2, this plan provides for the optimal use of the Alaskan Tanner crab resources by:

1. Minimizing fluctuations in stock abundance due to harvest by maintaining the full reproductive potential of the Tanner crab stocks.

2. Insofar as possible preventing industry overcapitalization and minimizing economic distress due to extreme fluctuations in harvest based on naturally fluctuating stock abundance.

3. Integrating management of Tanner crab stocks with those of other fisheries to maximize economic returns and minimize adverse impact on other stocks.

Considering the status of the data available on the Tanner crab stocks, and the social and economic institutions which depend on them, these objectives may be best met by avoiding substantive changes in the current and historical system of regulation and management until the consequences of such changes are quantified in terms of the potential costs and benefits.

8.2. AREAS, FISHERIES AND STOCKS INVOLVED

Refer to section 3.1 of this plan.

8.3. MANAGEMENT MEASURES AND RATIONALE

8.3.1 Domestic

With respect to the domestic fishery, it is the objective of the management plan to: (1) adopt a management regime which results in the implementation of conservation and management measures for Tanner crab which will result in achieving the optimum yield; (2) avoid disruption in the Tanner crab fishery during the implementation phase; and (3) select management measures which are consistent with the National Standards and applicable law.

The existing State regulatory system for Tanner crab was developed by the Alaska Board of Fisheries over years of analysis and deliberation, and through the use of public proposals, written and oral testimony, and input from advisory committees. It has been augmented and refined by recommendations of ADF&G biologists responsible for management of Tanner crab, and has proven itself to be effective and workable.

Therefore, in order to establish a management regime for the domestic Tanner crab fishery, this management plan adopts the management system presently employed by the State of Alaska, consistent with the FCMA (including the National Standards) and other applicable laws. The current State management measures are described in Section 3.3.2 of this Plan, and are set forth in detail in the State statutes and regulations, which are contained in Appendix 11.2.

This approach is dictated by several very important factors:

1. Elsewhere in this Plan, the biological, economic, and social requirements for successful management of the Tanner crab resource are discussed in detail. There is unquestionably a lack of information respecting many facets of this resource which demands further research and evaluation in the future. However, on the basis of existing knowledge and data, the Alaska management system is well suited to meet these requirements. Particularly important is the recognition in this system that the inevitable discovery of new information relating to Tanner crabs, which may be wholly unanticipated at the present time, will require adjustments in management measures and philosophies. By permitting a controlled increase in harvesting while closely monitoring resource conditions and trends, a margin of error is built in to protect against unsuspected miscalculations which could damage sustained production.

2. Any modern regulatory system is necessarily complex. However, the Alaskan management system has been developed gradually over the years with the full participation of the users who are subject to the regulations. Consequently, the Alaska regulations and the policies behind them are both understood and supported by fishermen.

3. The familiarity of user groups with the present Alaska regulations is complemented by the background and expertise of the management staff of the Alaska Department of Fish and Game. Field biologists have been working with this program for a number of years; their research and recommendations have assisted in its formulation. To the maximum extent possible, the management system adopted should avoid duplicating, at the Federal level, the structure currently existing at the State level.

4. Enforcement in Alaska is extremely difficult due to substantial variations in local conditions (which is reflected in the regulations), the size of the area which must be covered, and the mobility and efficiency of fishing vessels. The existing Alaska regulations were developed to accommodate considerations of enforceability as well as optimum conservation and management measures. Moreover, enforcement would be vastly complicated if State regulations (applicable in waters of the State) and Federal regulations (applicable offshore) are not identical, or substantially similar, since most Tanner crab vessels will move through both areas of jurisdiction and all Tanner crabs look alike.

8.3.1.4. In-season Adjustment of Time and Area

Management of shellfish fisheries by the State of Alaska in recent years compares very favorably with management of most other fisheries in the United States and elsewhere. The shellfish resources are in a good biological condition and the dependent user groups are in an economically viable condition. The success of this management program may be largely attributed to the deliberate flexibility built into the governing system by State law and the resultant ability of the Board of Fisheries and the Department of Fish and Game to undertake timely changes in the regulations to meet changing needs and conditions. This flexibility, which is realized through annual revision of the regulations by the Board together with emergency orders and regulations issued in-season by the Department, results in many benefits:

(a) New information and data relating to resource management can be immediately incorporated into the management program, even when the fishery is in progress.

(b) The management approach adopted by the Board before the season can be adjusted and refined during the season on the basis of assessments of actual resource conditions.

(c) Unanticipated resource conditions can be reacted to immediately to prevent both underfishing and wasteful underutilization.

(d) The dangers posed by high effort levels and efficient harvesting units (such as where fleet tank capacity equals or exceeds an OY) can be closely controlled.

(e) Unexpected development with respect to economic and social factors (natural disaster, changes in marketing, conditions, cannery fires, etc.) can be accommodated so the shellfish resources are distributed and allocated in a manner which maximizes overall public benefits.

(f) Management philosophies and policies formulated through legislative and administrative processes may be carried out in

the field by biologists familiar with local conditions.

(g) Management approaches which are proving unworkable or which are imposing undue hardships on users may be changed at once.

(h) Necessary in-season refinements in management programs can be accomplished primarily in the field with the advice and assistance of the users most directly affected.

Similar management flexibility should be an integral part of the Federal Regulatory System which will be applicable to the Tanner crab fishery pursuant to this plan.

NPFMC FINDING ON THE SPECIFICATION OF THE OPTIMUM YIELD AND THE ISSUANCE OF FIELD ORDERS

The Council finds that the Optimum Yields in this plan, which are based upon projections of the status of the stocks, economic and other conditions several months in advance of the actual conduct of the fishery, may be found to be mis-specified in light of unpredicted and unanticipated adverse or favorable stock conditions which are revealed in-season. Under such circumstances, the Council further finds it appropriate, for conservation purposes only, that the Regional Director of the National Marine Fisheries Service, Alaska Region, in close coordination with the Commissioner of the Alaska Department of Fish and Game, take immediate action by issuing field orders adjusting time and/or area restrictions; therefore, this plan provides that seasons and areas shall be subject to in-season adjustment by the Regional Director of the National Marine Fisheries Service. The Regional Director or his designee may adjust season opening and closing dates based upon the following considerations:

1. The effect of overall fishing effort within the registration area;

2. Catch per unit effort and rate of harvest;

3. Relative abundance of Tanner crab within the area in comparison with preseason expectation;

4. The proportion of immature or soft shell Tanner crab being handled;

5. General information on the condition of Tanner crab within the area;

6. Information pertaining to the optimum yield for Tanner crab within the registration area; or

7. Any other factors necessary for the conservation and management of the Tanner crab resource.

In order to assume effective management of the Tanner crab resource as a unit throughout its range, in-season adjustments made by the Regional Director must be coordinated with similar actions taken by the State regarding waters under state jurisdiction. It is necessary that the Regional Director, to the extent possible, act in conjunction with the Alaska Department of Fish and Game in order to effect uniformity of management in State waters and the Fishery Conservation Zone. As a result, any changes proposed by the Regional Director will be accompanied by advance notice to the State to allow for opportunity to maintain such uniformity. In most cases, the Regional Director will exercise his authority on the basis of recommendations received from the Department, and will rely on the Department for season data, reports, and assessments necessary to make a determination as to the advisability of any action contemplated. In all cases, continuous consultation between ADF&G and the Regional Director will be maintained.

It is expected that the actual opening and/or closing dates for the seasons prescribed in this plan will be adjusted by the Regional Director pursuant to the Authority described in this section. Such action is not considered emergency action that would require amendment of the plan, or regulations implementing the plan; adjusting the season opening and closing dates is meant to be an inherent part of the seasons themselves. For this reason, any adjustments made by the Regional Director or his designee will be effected by the issuance of a field order and announcement in the manner currently utilized by the State of Alaska.

Any in-season amendment of the Plan's season or area or other implementing regulations beyond the scope of the above described authority will be accomplished by emergency regulation, as provided by section 305(e) of the Act, in accordance with the recommendation of the Regional Director following consultation with the Commissioner of the Department of Fish and Game. It is understood that time will often be of the essence in making effective the aforementioned adjustments and changes.

8.3.2. Foreign

That portion of the *Preliminary Management Plan for King and Tanner Crab of the Eastern Bering Sea* which deals with the Tanner crab fishery will remain in force except that: (1) the area of legal fishing shall be north of 58° N. latitude and west of 164° W. longitude in the Bering Sea; and (2) for the Bering Sea management area, see section F.8.3.2. of this Plan. (The referenced Preliminary Management Plan appeared in the Federal Register on February 11, 1977. See appendix 11.6.

Further details may be found under the Bering Sea management area. Purpose and rationale for these measures may be found in Sections 3.3.2., 3.3.3., 6.0. and 7.0. and under equivalent sections in the Bering Sea management area.

8.3.3. Relationship of the Recommended Measures to Existing Applicable Laws and Policies

8.3.3.1. Fishery Management Plans Prepared by the Secretary of Commerce

The fishery management plan now in effect was prepared by the National Marine fisheries Service and deals solely with the foreign fishery for Tanner and king crab. This plan was prepared in January of 1977 and adopted by the Secretary in lieu of a council management plan (PMP 1977).

8.3.3.2. Federal Laws and Policies

The Fishery Conservation and management Act of 1976 (the Act, P.L. 94-265) requires that fishery management plans be consistent with the provisions of the Act, including the seven National Standards for fishery conservation and management. The National Standards are:

1. Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery.

2. Conservation and management measures shall be based upon the best scientific information available.

3. To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.

4. Conservation and management measures shall not discriminate between residents of different States. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (A) fair and equitable to all such fishermen; (B) reasonably calculated to promote conservation; and (C) carried out in such a manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.

5. Conservation and management measures shall, where practicable, promote efficiency in the utilization of fishery resources; except that no such measure shall have economic allocations as its sole purpose.

6. Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.

7. Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.

This plan proposes to adopt the regulatory measures of the State of Alaska to the extent that they are consistent with these National Standards and other provisions of the Act.

8.3.3.3. State Laws and Policies

Adoption of the proposed regulatory regime in this plan will be compatible with the State of Alaska's management program for its citizens outside the Territorial Sea fishing for Tanner crab and all U.S. citizens within the Territorial Sea fishing for the same resource.

8.4 ENFORCEMENT REQUIREMENTS

Domestic. Because of the large areas involved, direct patrol of all potential Tanner crab grounds off Alaska is difficult and expensive. Indirect measures have been, and will be, required to implement the necessary management measures for this resource. The State of Alaska has developed a system described in this section, to minimize the need for and cost of direct enforcement using: 1) landing laws, both general and by management area; 2) area registrations and inspection; 3) descriptions and marking of Tanner crab gear.

1. *Landing laws.* The basic system of regulations used to enforce many of Alaska's conservation laws have prohibited the landing or possession of Tanner crab and Tanner crab gear in order to protect closed areas.

Increasing demand for Tanner crab and the potential ability of the fishing fleet to overharvest the resource require positive controls to prevent overfishing. Landing laws prohibit the landing, including possession, sale, trading, transporting or purchasing of all unprocessed Tanner crab as long as the closure is effective. The prohibition also applies to the possession of Tanner crab gear (in operable condition) in areas or at times contrary to regulation.

2. *Area Landing Laws.* Provisions are necessary to manage individual Tanner crab fisheries with flexibility to accomodate local conditions. Therefore a landing law must be effective within each management area to prevent illegal fishing in closed areas, yet permit landings of crab to processors in closed areas, that were taken in open areas. This is accomplished by:

3. *Area Registration and Inspection.* The Tanner crab fishery is divided into manage-

ment areas ('Statistical areas' in State of Alaska regulations). Fishermen intending to fish Tanner crab are required to specify in advance of Tanner crab seasons that registration area(s) in which they expect to operate.

There are two types of registration areas—exclusive and non-exclusive. Currently there are two exclusive areas (E: Prince William Sound and H. Cook Inlet) and two non-exclusive areas (A: Southeastern-Yakutat and J: Westward). The exclusive areas are small and fished by local fleets while the non-exclusive areas are quite large with developing fisheries and some sections that are not fully explored. The expansion of the fishery is directed, through the non-exclusive provision, to areas that can generally sustain further production.

Registrations must be accomplished prior to the earliest season opening date in any exclusive registration area. Provision is made for late registration for cause.

Fishermen and boats registered for an exclusive area may fish only in that area. Those registered for non-exclusive areas may shift to other non-exclusive areas by re-validating for the new area.

Provision is also made for allowing boats fishing in one area to transport catches caught there into a different registration area for processing. Lack of processing facilities in some areas at times and price differentials between areas requires this provision.

Area registration, pre-fishing validation requirements and provision for flexibility in marketing combine to insure accurate reporting of the areas where catches were made and decrease the likelihood of covert fishing in closed areas, while at the same time allowing the transport of unprocessed crab through other registration areas if the need arise.

4. *Description and Marketing of Crab Pot Gear.* When king crab seasons (regulated by the State of Alaska) and Tanner crab seasons overlap the pot limit in those areas, Tanner crab should be the same as those for king crab to avoid enforcement problems. Gear should be marked to identify the boat fishing it to ensure compliance with pot limits. Pots used for Tanner crab should be described in a manner that separates them from pots used for other types of shellfish or bottomfish to reduce the likelihood of illegal fisheries on other species under the guise of Tanner crab fishing or conversely, fishing for Tanner crab under the guise of fishing for other species. Provisions should also be made for storing pots in shallow water in non-fishing condition.

This plan proposes to implement these enforcement requirements and management measures through regulations modeled, as closely as possible, on those now administered by the State of Alaska for the Tanner crab fishery. Current State enforcement (and management) measures are set forth in detail in the State statutes and regulations, contained in Appendix 11.2 of this plan.

8.5 REPORTING REQUIREMENTS

Domestic

Catch Reporting. Catch reporting by the fishermen and the buyers is necessary for proper management. When a Tanner crab fisherman lands his catch, a report in the form of a "fish ticket" must be made. The information required provides a statistical data base on the fishery and shall include information on: type and quantity of fishing gear used, catch by species in numbers of fish or weight thereof, areas in which fishing was engaged in, time of fishing, number of hauls, and such other information as required by the Secretary of Commerce.

Foreign

Fleet Disposition Reports. The appropriate fleet commander or individual vessel master will report to the Director, Alaska Region, National Marine Fisheries Service, Juneau, by radio prior to the commencement of fishing and the arrival in the Region of each fishing and processing vessel, giving the vessel's name and other identifying marks (such as U.S. permit number, size, intended target species, and intended fishing area). A similar report will be made at the time of departure of each vessel from the area or Region. These reports, augmented with U.S. surveillance observations, observer reports, and monthly catch and effort reports, will be used to monitor adherence to catch limitations.

Observers. Each nation operating in the Region will have available at no cost to the United States, accommodation for 2 U.S. observers on factoryships and one U.S. observer on fishing vessels. Observers will be assigned to individual vessels and for periods at the discretion of the U.S. to monitor catches: estimate species, size and age composition; and collect other biological data as appropriate.

The observer will be accorded the rank of a ship's officer and will be assisted in transmitting messages to the United States Government whenever requested.

All observer programs pertaining to foreign crab fisheries will be administered by the Northwest Fisheries Center, National Marine Fisheries Service. Observer coverage and activity will be scheduled in consultation with the North Pacific Management Council, at the NMFS Alaska Regional Office, and the Commander, U.S. Coast Guard Pacific Area.

Each nation whose fishermen operate in the Region shall report to the Director, Alaska Region. National Marine Fisheries Service, Juneau, by May 30 of the following year annual catch and effort statistics, as follows: *Effort* in pots hauled; *Catch* in metric tons and number of crab. Each to be supplied by vessel class, by 10-day period, by ½° (Lat.)×1° (Long.) statistical area, by the following species: *C. bairdi, C. opilio* and any other crab species.

In addition to the annual statistical report above, each nation will report within 3 days following each 10-day fishing period, provisional 10-day fishery information as follows: *Effort* in total pot lifts; and *Catch* in metric tons and number of crab of *C. opilio* and *C. bairdi.*

Vessel Reporting. The operator of each foreign vessel issued a permit shall notify the director of the appropriate National Marine Fisheries Service region and the commander of the appropriate Coast Guard command of the time and position at which the vessel will begin activities to be conducted under the permit at least 24 hours before beginning any such activity. Similar notice shall be given at least 24 hours prior to completion of the activity or departure from the area.

Vessel Identification. Each foreign fishing vessel for which a permit has been issued shall display its hull number or international radio call sign amidships on the deck house or hull, and on the uppermost weather deck.

Facilitation of Enforcement. The operator of any vessel subject to the provisions of the Act shall immediately comply with instructions issued by authorized officers to facilitate boarding and inspection of the vessel for purposes of enforcing the Act and these regulations.

8.6 COOPERATIVE RESEARCH REQUIREMENTS

Bona fide fishery or fishery-related research (but no exploratory fishing where commercial quantities of fish are retained) by foreign governments will be encouraged. Valid results of such research will be considered in determining total allowable catches and other management measures. Cooperative U.S.-foreign research ventures will be planned and executed when they are found to be in the best interest of the United States.

8.7 PERMIT REQUIREMENTS

Foreign

No foreign vessel shall engage in fishing for fish over which the United States exercises exclusive fishery management authority unless it has on board a permit issued pursuant to the *Preliminary Fishery Management Plan for King and Tanner Crabs of the Eastern Bering Sea* (see Appendix 11.6).

Domestic

Licenses will be required of all domestic vessels in order to engage in the Tanner crab fishery.

Registration will be required of domestic fishermen primarily for the purpose of monitoring the resource and obtaining catch information. The number of permits available will not be limited.

8.8 FINANCING REQUIREMENTS

8.8.1 Management and Enforcement Costs

Currently unavailable, but should be generally of the same level as in 1977 since much of the same management regime is proposed.

8.8.2. Expected State and Federal Revenues, Taxes, Fees

Refer to Section 3.7 of this plan. Revenues will depend to a large degree on the magnitude of the 1978 harvest which is undefined except in the case of foreign quotas.

SOUTHEASTERN MANAGEMENT AREA

A.3.0. DESCRIPTION OF FISHERY

A.3.1. AREAS AND STOCKS INVOLVED

In this plan, the Southeastern management area will be discussed in terms of two districts: Southeast and Yakutat.

The target species is *Chionoecetes bairdi.*

Data to determine stock delineations and boundaries are not available. Additionally, commercial quantities of other Tanner crab species, *C. opilio* or *C. tanneri,* have not been recorded.

The Southeast district encompasses all waters of Southeastern Alaska from the International border at Dixon Entrance to the latitude of Cape Spencer.

Most nearshore areas in the northern portion of the Southeast district contain Tanner crab in sufficient quantities to support commercial harvests. The southern portions of the district contain crab in small numbers and are commercially harvested to a lesser degree.

The Yakutat district encompasses all waters from the latitude of Cape Spencer to the longitude of Cape Suckling.

Most nearshore locations within this district also contain crab in sufficient quantities to support commercial harvests. Major catches are reported from Icy Bay, Yakutat Bay, the Point Manby shore and in the vicinity of Point Riou.

A.3.2. HISTORY OF EXPLOITATION

A.3.2.1. Domestic Fishery

A.3.2.1.1. *Description of User Groups*

Tanner crab are utilized predominately by commercial fishermen. A relatively small amount are utilized by subsistence fishermen although the Alaska Department of Fish and Game does not maintain subsistence harvest statistics.

A.3.2.1.2. *General Description of Fishing Effort*

The Tanner crab and red king crab seasons open currently. During the red king crab season, September 1 through January 31, most Tanner crab effort is secondary to the red king crab fishery. From January 31 through the seasons's end (May 15) effort is concentrated toward the harvest of Tanner crab. In the Icy Strait area, major fishing effort occurs during November, December, and January.

A.3.2.1.3. *Catch Trends*

Southeast District. In 1968, the market demand for Tanner crab products encouraged an exploratory fishery resulting in a small seasonal harvest of 223,000 pounds (101 mt). In the 1969/70 season the fishery expanded, resulting in a harvest of 660,300 pounds (300 mt). An apparent low market demand and resulting price disputes held the 1970/71 seasonal harvest to 167,400 pounds (76 mt). Since the 1971/72 season harvest of 657,700 pounds (298 mt), the harvest generally increased to a peak during the 1975/76 season at 2,158,800 pounds (979 mt). Historic catch is documented in Table A1.

TABLE A1. SOUTHEASTERN MANAGEMENT AREA TANNER CRAB CATCH, NUMBER OF VESSELS, NUMBER OF LANDINGS, AND UNWEIGHTED MEAN CATCH PER LANDING FOR SOUTHEAST AND YAKUTAT DISTRICTS.

SOUTHEAST DISTRICT

SEASON[1]	CATCH POUNDS	CATCH MT	NUMBER VESSELS	NUMBER LANDINGS	UNWEIGHTED MEAN CATCH PER LANDING POUNDS	UNWEIGHTED MEAN CATCH PER LANDING MT
1968/69[2]	223,045	101	27	160	1394	0.63
1969/70[3]	660,337	300	31	360	1834	0.83
1970/71	167,378	76	12	72	2325	1.05
1971/72	656,661	298	23	274	2397	1.09
1972/73	1,339,953	608	30	340	3941	1.79
1973/74	1,309,673	594	46	419	3126	1.42
1974/75	839,304	381	29	241	3483	1.60
1975/76[4]	2,157,752	979	26	369	5448	2.47
1976/77[5]	1,850,380	839	30	290	6392	2.90
TOTAL	7,453,103	3381	224	2235		
MEAN	919,263	417	28	279	3335	1.51

YAKUTAT DISTRICT

1972/73	540,580	245	6	36	15016	6.81
1973/74	1,872,357	849	11	110	17021	7.72
1974/75	1,997,199	906	13	63	31702	14.4
1975/76	1,724,649	782	3	34	50725	23.0
1976/77	827,864	376	6	12	71988	32.7
TOTAL	6,134,785	2783	33	243		
MEAN	1,533,696	696	8	61	25246	11.5

1/ Season: September 1 through May 15 beginning with 1974/75 season
2/ 1968/69 data from ticket log of ADF&G fish tickets (1968) and ADF&G automated annual fish ticket reports hand compiled to seasons (1969).
3/ 1969/70 through 1974/75 data from ADF&G automated annual fish ticket data reports hand compiled to seasons.
4/ 1975/76 data from ADF&G automated annual fish ticket reports (1975) and ADF&G ticket log (1976) hand compiled to seasons.
5/ 1976/77 data from ADF&G ticket log, season in progress

Yakutat District. Historic catch information (Table A1) indicates the initial harvest in this fishery of 540,580 pounds (245 mt) occurred during the 1972/73 season. From 1973/74 through 1975/76, catches have ranged from 1,724,650 pounds (782 mt) during the 1975/76 season to 1,997,200 pounds (906 mt) during the 1974/75 season. The average harvest since the inception of this fishery is 1,533,700 pounds (696 mt).

A.3.2.1.4. Description of Vessels and Gears Employed

Southeast District. During the early development of the fishery in 1968, seine type vessels averaging 51 feet (15.5 m) in keel length and ranging from 32 to 82 feet (9.8 to 25.0 m) participated in the fishery. These vessels had an average net tonnage of 35 tons (32 mt) and a range from 5 to 125 net tons (4.5 to 113 mt). Vessel characteristics have remained fairly consistent since the 1969/70 season. (Table A2).

TABLE A2. SOUTHEASTERN MANAGEMENT AREA TANNER CRAB FLEET CHARACTERISTICS BY SEASON FOR SOUTHEAST AND YAKUTAT DISTRICTS 1/

SOUTHEAST DISTRICT SEASON	NUMBER VESSELS	MEAN KEEL LENGTH FEET	MEAN KEEL LENGTH M	RANGE OF KEEL LENGTH FEET	RANGE OF KEEL LENGTH M	MEAN NET TONNAGE TONS	MEAN NET TONNAGE MT	RANGE NET TONNAGE TONS	RANGE NET TONNAGE MT	MEAN HOLD CAPACITY 2/ LBS	MEAN HOLD CAPACITY 2/ MT
1968/69	27	51	15.5	32-82	9.8-25.0	35	32	5-125	5-113		
1969/70	31	52	15.8	36-74	11.0-22.6	30	27	6-77	5-70		
1970/71	12	49	14.9	36-68	11.0-20.7	26	24	4-50	4-45		
1971/72	23	49	14.9	31-72	9.4-21.9	27	24	4-77	4-70		
1972/73	30	48	14.6	30-86	9.1-26.2	31	28	5-134	5-122		
1973/74	46	44	13.4	27-85	8.2-26.0	22	20	1-64	1-58		
1974/75	29	46	14.0	30-85	9.1-26.0	27	24	5-64	5-58		
1975/76	26	48	14.6	33-85	10.1-26.0	29	26	5-67	5-61		
1976/77	30	49	14.9	32-85	9.8-26.0	30	27	5-67	5-61	24,000	11
YAKUTAT DISTRICT											
1972/73	6	66	20.1	40-80	12.2-24.4	81	73	27-138	24-125		
1973/74	11	55	16.8	30-86	9.1-26.2	41	37	18-89	16-81		
1974/75	13	73	22.3	38-103	8.2-31.4	92	83	32-171	29-155		
1975/76	3	112	34.1	78-167	23.7-50.9	188	171	89-338	81-307		
1976/77	6	80	24.4	32-103	9.8-31.4	107	96	23-197	21-179	94,200	43

1/ Source: ADF&G vessel register and fish tickets
2/ Estimated by area shellfish biologist

During the 1968–69 season a variety of pots, including rectangular king crab pots and round Dungeness crab pots, were utilized. The round Dungeness crab pots are no longer used. In addition to the modified king crab pots, pots of pyramid and conical design have been developed specifically for the Tanner crab fishery and are widely utilized.

Yakutat District. During the first 2 seasons vessel types varied greatly but beginning with the 1974–75 season, participating vessels were designed specifically as king and Tanner crab boats. This trend continued in 1975–76, but by 1976–77 two smaller vessels had entered the fishery. During the 1976–77 season the mean length was 80 feet (24.4 m) with a range from 32 to 103 feet (9.8 to 31.4 m, see Table A2). Mean net tonnage was 107 tons (97 mt) with a range from 23 to 197 net tons (21 to 179 mt) and each vessel had an average hold capacity of 94,200 pounds (43 mt). Vessels producing the majority of the harvest are Westward king and Tanner vessels.

Gear utilized in this fishery is almost exclusively rectangular 6×6 foot (1.8 m) or 7×7 foot (2.1 m) standard king crab pots.

A.3.2.2. History of Foreign Exploitation

There is no record of foreign exploitation of Tanner crab within waters of the Southeastern management area.

A.3.3. HISTORY OF MANAGEMENT

A.3.3.1. Management Institutions, Policies, Jursidiction

The Southeastern management area is defined in A.3.1. The Division of Commercial Fisheries within the Alaska Department of Fish and Game exercises management control over the fishery. Inseason management responsibility, preliminary management plan development, and management related research is conducted by the regional office in Juneau and the area office in Petersburg. See Section 3.3.1.

A.3.3.2. Domestic

A.3.3.2.1. and A.3.3.2.2. Regulatory Measures and Purpose of Measures

During the first few regulatory years (through 1972) regulations permitted the harvest of only male Tanner crab by pots, ring nets, or shrimp beam trawls (Table A3).

TABLE A3. REGULATORY HISTORY, SOUTHEASTERN MANAGEMENT AREA TANNER CRAB FISHERY -- SOUTHEAST (S.E.) AND YAKUTAT(YAK) DISTRICTS

REGULATION YEAR	FISHING SEASON	MIN. SIZE LIMIT	GUIDELINE HARVEST LEVEL 10^6 lbs	GEAR	AREA REGISTRATION
1969	None	None. males only	None	No pot limit; pots, ring nets, beam trawls.	None
1970	"	"	"	" "	"
1971	"	"	"	" "	"
1972	"	"	"	" "	"
1973	"	"	"	S.E.: 60 pots, king & Tanner combined; ring nets, beam trawls.	"
1974	Sept.1 - May 15	"	"	SE: same as 1973 except cotton escape seam on pots. YAK: 60 pots in Lituya Bay. bouy marking repealed.	Non-exclusive
1975	"	"	"	S.E.: same as 1974 except 60 pots combined during king crab season (Sept.1-Jan 31) 100 pots during remainder of Tanner season. YAK: 100 pots each in Lituya Bay and Yakutat bays.	"
1976	"	5.5 inches (140 mm)	S.E. 1.75 (794 MT) YAK: 3.0 (1361 MT)	S.E.: same as 1975 YAK: " " "	"
1977	"	"	"	S.E.: same as 1975 YAK: " " " (except exclude beam trawls)	"

Sources: ADF&G regulation booklet; 1972 through 1976, Alaska Board of Fisheries action 1977.

Since then, additional restrictions have been initiated; these restrictions and their rationale are described below:

1. *Fishing season:* in the fall of 1973 a fishing season from September 1 through May 15 was established to allow for acceptable meat recovery rates by the processing industry. In the vicinity of Icy Strait, industry representatives indicate that recovery rates are highest during the fall and early winter months.

The season was also applied to the Yakutat district since differing data was not available. Additionally, this fishery still appears to be developmental in nature and restrictions other than protection from fishing during critical life history stages was not deemed appropriate. The season has been maintained to allow for incidental catches and retention of Tanner crab during the king crab season.

The May 15 closure was established to prevent deadloss of softshell crab and to curtail fishing during the breeding and egg hatch season.

2. *Size limit:* A 5.5 inch (140 mm) minimum carapace width size limit was established for the 1976–77 fishing season. The size limit was based on Alaska Department of Fish and Game research conducted in Kodiak which indicates that this size allows male Tanner crab to contribute to stock reproduction before entering the fishery.

3. *Guideline Harvest Level:* A guideline harvest level based on historic catches plus an allowance for continued expansion of the fishery was implemented during the 1976–77 season. The strategy is to prevent overexploitation and allow for orderly development of the fishery.

4. *Gear:*

Southeast District: From 1969 through 1972 crab pots, ring nets, and beam trawls were established as legal commercial fishing gear. During the 1973–74 season the number of crab pots per vessel was established at 60. This coincides with gear regulations for the red king crab fishery to alleviate enforcement problems associates with concurrent fisheries. During the 1974–75 season a requirement for a cotton seam escape panel in each pot was established to reduce the fishability of lost pots. During the 1975–76 season the pot limit was modified to provide for 60 crab pots during the red king crab season (September 1 through January 31) and 100 pots thereafter to the close of the Tanner crab season.

Yakutat District. Prior to regulation year 1974, no pot limits had been established. Also during the 1974–75 season, no limit on units of gear was in effect for the majority of the management area. In Lituya Bay, however, a vessel could only fish a maximum of 60 pots. During the 1975–76 season, no limit on units of gear was in effect for any waters of the district except Lituya Bay and Yakutat Bay where the limit was a maximum of 100 pots per vessel. These pot limits apply only when the red king crab season is closed (February 1 through May 15), during the red king crab season (September 1 through January 31) a maximum of 60 pots only per vessel may be fished.

The pot limits established in the Lituya Bay and Yakutat Bay areas were to reduce the intensity of the fishery for these relatively restricted geographical areas.

5. *Area Registration:* During the 1974–75 fishing season, the Southeastern management area was designated a non-exclusive registration area as a portion of statistical area A.

A.3.3.3. Foreign.

There is no foreign Tanner crab fishery in Southeastern Alaska.

A.3.3.4. Effectiveness of Management Measures

The relatively short history of this fishery makes the evaluation of management measures difficult. The 1976–77 season will be the first season that harvest in the Southeast district is dependent on progeny of previously exploited stocks. It appears that the May 15 season closure date may allow fishing during molting periods in some years. Recent observations indicate that a closure date between April 15 and 30 may be more appropriate. Other management measures appear appropriate to maintain stock conditions considering current information.

A.3.4. HISTORY OF RESEARCH

A.3.4.1. Domestic

The Alaska Department of Fish and Game does not currently conduct a Tanner crab research program in the Southeastern management area. Other than dockside sampling of carapace width which is accomplished on a time-available basis, a limited amount of sampling aboard commercial vessels is accomplished. An analysis of data to estimate size at maturity of male Tanner crab from Auke Bay, Alaska, has been accomplished ADF&G personnel (Donaldson 1977).

A.3.4.2. Foreign

No foreign research is presently being conducted in the Southeastern management area.

A.3.5. SOCIO-ECONOMIC CHARACTERISTICS

A.3.5.1. Output of Subject Domestic Commercial Fishery

A.3.5.1.1. Value of Catch (ex-vessel)

Southeast District. The average ex-vessel price has ranged from 10 cents per pound in 1969 to 32 cents per pound in 1976 (Table A4). The total ex-vessel value has averaged $151,000 per season and ranged from $17,000 during the 1970–71 season to $475,000 during the 1975–76 season (Table A5). Ex-vessel value for the 1976–77 harvest through March 1977 totals $592,122 based on the ex-vessel price of 32 cents per pound.

Yakutat District. The average ex-vessel price has ranged from 14 cents per pound in 1972, to 32 cents per pound at present (Table A4). Total ex-vessel value has averaged $277,000 per season and ranged from $92,000 during the initial season in 1972–73 to $380,000 during the 1975–76 season (Table A5). The 1976–77 season ex-vessel value through March 1977 is $294.916.

TABLE A4.—*Unweighted mean ex-vessel price in dollars per pound, southeastern management area Tanner crab* [1]

Year	ex-Vessel price per pound
1969	$0.10
1970	.11
1971	.10
1972	.14
1973	.17
1974	.19
1975	.14
1976	.22
1977	.32

[1] Computed by dividing total ex-vessel price by annual harvest in pounds. Ex-vessel value and annual harvest provided by Alaska Commercial Fisheries Entry Commission.

TABLE A4.—*Total Ex-vessel value in dollars by season and district for southeastern management area* [1]

Fishing season	Total ex-vessel value Southeast	Yakutat
1968–69	$22,304.50	
191969–70	72,637.07	
191970–71	16,737.80	
191971–72	91,932.54	
191972–73	227,792.01	$91,898.60
1973–74	183,354.22	355,747.83
191974–75	117,502.56	279,607.86
1975–76	474,705.44	379,422.78
1976–77 [2]	592,121.60	264,916.48
19Total [3]	1,206,966.14	1,106,677.07
19Mean [3]	150,870.77	276,669.27

[1] Computed by multiplying seasons harvest in pounds by annual ex-vessel price per pound from Table A4. Assume year 1969=season 68–69. Season harvest from Table A1.

[2] Season in progress.

[3] Total and Mean without 1976–77 season data.

A.3.5.1.2. Description and Value of Products (Wholesale)

The Tanner crab harvest is processed into two major products: A frozen meat pack and a frozen section-in-shell pack. The frozen meat pack is further divided into salad packs, and/or leg packs. A portion of the frozen section-in-shell is comprised of "gourmet claws" which are the chelae with a portion of the posterior shell removed.

Southeast District. The wholesale value of the Southeast district Tanner crab products is approximately $1 million from the 1973–74 season harvest, $0.6 million from the 1974–75 season harvest and $1.6 million from the 1975–76 season harvest (Table A6). Wholesale value information from the 1976–77 season harvest is not presently available, but can be approximated at $1.4 million.

TABLE A6.—*First wholesale value of Tanner crab harvests by season for southeastern management area*

Season	Wholesale value (in dollars) Southeast	Yakutat
1973–74	$09,158.62	1,385,544.18
1974–75	621,084.96	1,477,927.26
=1975–76	1,599,736.48	1,276,340.26
1976–77 [1]	1,369,281.20	612,619.36

[1] Incomplete.

Source: ADF&G Catch and Production. Juneau.

Yakutat District. The wholesale value of the Yakutat district Tanner crab products was approximately $1.4 million from the 1973–74 season harvest, $1.5 million from the 1974–75 season harvest, $1.3 million from the 1975–76 season (Table A6). Wholesale value information is not available from the 1976–77 season. However, an approximation of wholesale value calculated on the catch through March 1977 is $0.6 million.

A.3.5.1.3. Markets, Domestic and Foreign

The bulk of the meat pack is marketed and consumed in the United States and Canada. The major portion of the section pack is marketed in Japan with lesser amounts marketed in England and other European countries. As of December 1976,

United States market demands for Tanner meat products exceeded that for section (U.S.D.C. 1976). Tanner crab market demands are at least partially influenced by the supply of other crab products in the United States. See Section 3.5.1.3.

A.3.5.2. Domestic Commercial Harvesting Characteristics

A.3.5.2.1. Total Gross Income of Fleet (from subject fishery and all other fisheries)

The gross income of the Southeastern Tanner crab fleet from all fisheries (King crab, halibut, salmon, etc.) was $3.4 million in 1976. This compares to a Tanner crab harvest valued at $772,500. The average total gross income per vessel was $121,730. Table 5 shows the value of Tanner crab catch and total gross income for all fisheries by management area.

A.3.5.2.2. Investment in Vessels and Gear

Quantitative information concerning investment in vessels and gear is not available. See Section 3.5.2.2.

A.3.5.2.3. Annual Participation in the Fishery

Southeast District. An estimated 2,583 vessel days were utilized in the harvest of Tanner crab during the 1975–76 season. This figure assumes each vessel made 14 landings and each landing required 6 days fishing and 1 day running time.

Yakutat District. An estimated 408 vessel days were utilized in the harvest of Tanner crab during the 1975–76 season, based on each landing requiring 10 days fishing and 2 days running time.

A.3.5.2.4. Total Manpower Employed

Southeast District. An estimated 90 individuals were employed in the harvest of Tanner crab during the 1976–77 season. This includes skippers and crewmen, and was derived by multiplying the number of participating vessels by three (the average vessel crew).

Yakutat District. An estimated 24 individuals were employed during the 1976–77 season (through March). This estimate includes skipper and crewmen, and was derived by multiplying the number of participating vessels by four (the average vessel crew).

A.3.5.2.5. Economic Viability

Data are not available for the Southeastern management area. See Section 3.5.2.5.

A.3.5.3. Domestic Commercial Processing Characteristics

A.3.5.3.1. Total Gross Income of Area Processors

These data are not available for the Southeastern management area processors. However, first wholesale value has been estimated as previously mentioned (A.3.5.1.2.) and itemized in Table A6.

A.3.5.3.2. Investment in Plant, Equipment, Etc.

Data are not available. See Section 3.5.3.2.

A.3.5.3.3. Total Employment and Labor Income

Total employment is not available. An estimated processor employment is 450 employees. Income of this labor force is not known. See Section 3.5.3.3.

A. 3.5.3.4. Economic Viability

Data are not available. See Section 3.5.3.4.

A.3.5.4. Recreational Fishing Characteristics

There are no regulated sport or recreational fisheries for Tanner crab within the Southeastern management area.

A.3.5.5. Subsistence Fishing Characteristics

A subsistence fishery, which is at least partially recreational in nature, is open throughout the year with no sex, size, or gear restrictions except that pot buoys must be marked with the name and address of the fisherman, and the pot must be attended at least once each 14-day period. The possession limit is 30 crab per person per day and crab may not be sold, traded, or bartered.

A.3.5.6. Indian Treaty Fishing Characteristics

There are no Indian treaty fishing rights for Tanner crab within the Southeastern management area.

A.3.5.8. Community Characteristics

A.3.5.8.1. Total Population

Southeast District. The Southeast district contains four boroughs and 24 cities within its geographic boundaries with a reported population totaling 45,029 individuals (Department of Labor 1977). Tanner crab are landed and processed in five communities with a total population of 26,388. The Tanner crab fishery has a direct effect on these five municipalities (Junea, Sitka, Hoonah, Pelican, and Petersburg) and indirectly affects the remaining boroughs and cities.

Yakutat District. The Yakutat district has a single community located within it (the City of Yakutat) with a reported population of 190 (Department of Labor 1977). Three other communities are affected by the Yakutat fishery since all processing of Yakutat Tanner crab is accomplished in Sitka, Pelican, or Cordova. The City and Borough of Sitka has a population of 6,109 and Pelican has a population of 133. Cordova has a population of 2,406.

A.3.5.8.2. Total Employment

See Section 3.5.8.2.

A.3.5.8.3. Total Work Force

See Section 3.5.8.3.

A.3.6. INTERACTION AMONG USER GROUPS

There are no known interactions among user groups. However, a substantial number of king crab fishermen participate in the Tanner and king crab fisheries concurrently.

A.3.7. FEDERAL AND STATE REVENUES DERIVED FROM FISHERY

These values are not available by management area but are reported on a statewide basis in Section 3.7.

A.4.0. BIOLOGICAL DESCRIPTORS

A.4.1. LIFE HISTORY FEATURES

The general life history of *C. bairdi* is described in the biological history portion of this plan (Section 4.0) from research done in the Kodiak area. Inconsistencies with this information have not been documented in stocks within the Southeastern management area.

A.4.2. STOCK LIMITS

Southeast District. Distinct stock delineations are not possible with present information. However, ADF&G personnel manage Tanner crab as discrete stocks in Lynn Canal, Icy Strait, Frederick Sound, Peril Strait, Seymore Canal, waters adjacent to Juneau, and all waters including and south of Sumner Strait.

Yakutat District. Definitive information concerning distinct stock units is not available. However, information indicates that the Icy Bay crab, the Yakutat Bay crab, and the crab inhabiting the shelf outside the bays all have distinct characteristics indicating the possibility of distinct stocks.

A.4.3. CATCH-EFFORT DATA

Refined catch per unit effort data are presently not collected in the Southeastern Tanner crab fishery. A gross estimate of C.P.U.E. expressed as catch per pounds per vessel landing has been listed by fishing season (Table A1).

A.4.4. SURVEY AND SAMPLING DATA

Relative abundance indices of Tanner crab stocks in the Southeastern management area are not conducted by the Alaska Department of Fish and Game. Dockside sampling of the commercial catch for carapace width frequency distribution has been accomplished since the 1973/74 season and has been summarized by appropriate size classes (Table A7). The dockside sampling data have not been expanded to include shell age and average weight per crab.

Some surveying of the shelf area running north and east of Point Manby has been accomplished by the National Marine Fisheries Service utilizing International Pacific Halibut Commission data (Hughes 1974). However, this report does not attempt to estimate population abundances, and the survey did not include Yakutat Bay which is a major fishing area.

A.4.6. QUALITY OF DATA

Refer to statewide section 4.6.

A.4.8. CURRENT STATUS OF STOCKS

A.4.7.1. Maximum Sustainable Yield (MSY)

Southeast District. Based on the relatively short history of the fishery, the continued increase in gross C.P.U.E. (see Table A1), and the non-availability of population abundance information it appears that historic harvest levels have not approached a MSY level. Therefore, any estimate of MSY should exceed the largest harvest to date of 2,158,000 pounds (979 mt). As such, a tentative weak estimate of 2.5 million pounds (1134 mt) is specified for this district.

All harvests prior to the 1976/77 season were accomplished without a legally imposed minimum size limit. However, preference for crab larger than 5.5 inches (140 mm) is displayed in the dockside sampling summary (Table A7) by season beginning the 1973/74 season.

TABLE A7.—*Tanner crab dockside sampling of carapace width by size class, season, and district for southeastern management area.*

Width frequencies by size class	Season 1973–74 (percent)	1974–75 (percent)	1975–76 (percent)	1976–77 (percent)
	Southeast District			
0139 mm	15.9	12.2	8.1	5.2
140–166 mm	68.8	67.5	81.0	80.2

TABLE A7.—*Tanner crab dockside sampling of carapace width by size class, season, and district for southeastern management area.*—Continued

Width frequencies by size class	Season 1973-74 (percent)	1974-75 (percent)	1975-76 (percent)	1976-77 (percent)
Southeast District				
0167 mm	15.3	20.3	10.9	14.5
Mean width (mm)	152.9	155.4	153.9	154.1
Sample size	1633.0	796.0	1472.0	2276.0
Yakutat District				
0139 mm	43.0	39.5	29.5	23.4
140-166 mm	56.7	59.8	68.7	75.0
0167 mm	0.3	0.7	1.8	1.6
Mean width (mm)	142.5	142.2	145.7	144.7
Sample size	1472.0	732.0	437.0	320.0

[1]Source: ADF&G unpublished catch statistics. Juneau.

Yakutat District. Based on the short history of the fishery, the continued increase in C.P.U.E. (see Table A1), and the availability of survey data (Hughes 1974), it appears as if historic harvest levels have not approached a MSY level. Therefore, a tentative weak estimate of a MSY of 3 million pounds (1,360 mt) is specified for this district.

A.4.7.2. Equilibrium Yield (EY)

Existing data are insufficient to determine EY.

A.4.7.3. Acceptable Biological Catch (ABC)

Southeast District. Biological data necessary to modify MSY to determine ABC are not available. Therefore, ABC is estimated to be 2,500,000 pounds (1,134 mt) to provide for a continued, orderly development of the fishery in this district.

Yakutat District. Biological data required to modify MSY to determine ABC are not available. Therefore ABC is estimated to be 3 million pounds (1,361 mt) to provide for a continued, orderly development of the fishery in this district.

A.4.8. ESTIMATE OF FUTURE STOCK CONDITIONS

Given a limited data base, only subjective statements are possible: C.U.P.E. indicators of stock abundance are currently high in relation to earlier years, although the 1976-77 catch for the Yakutat district is below average. Therefore, stock conditions are expected to remain healthy, assuming no changes in mating success or other critical life history stages.

A.5.0. CATCH AND CAPABILITY DESCRIPTORS

A.5.1. DATA AND ANALYTICAL APPROACHES

A.5.1.1. Domestic

Southeast District. Table 6, p. 50 lists the potential commercial harvesting capabilities in the Southeast district Tanner crab fishery. The number of vessels is documented through fish ticket returns which indicate landings from the district during the 1976-77 season. Hold capacities were estimated for each vessel by the ADF&G shellfish management biologist and seasonal harvesting capacities were determined by multiplying hold capacity by the average number of trips per vessel. This provides a seasonal capacity of 8,244,000 pounds (3,739 mt).

Yakutat District. Table 6 lists the potential commercial harvesting capabilities of the Yakutat district Tanner crab fishery. Calculated on the same basis as the Southeast district, the seasonal capacity is estimated at 4,473,000 pounds (2,030 mt).

A.5.1.2. Foreign

There is no foreign fishery in the Southeastern management area.

A.5.2. DOMESTIC ANNUAL CAPACITY (DAC)

The DACs for the Yakutat and Southeast districts are 4,472,916 and 8,244,000 pounds (2,029 and 3,739 mt), respectively. These values are discussed in Section A.5.1.1.

A.5.3. EXPECTED DOMESTIC ANNUAL HARVEST (DAH)

Southeast District. The DAC estimate has not been approached during previous seasons due to many influences including (but not limited to) market conditions, fleet availability, vessel type, and the unknown abundance of Tanner crab as the fishery continues to develop.

The market demand for Tanner crab products appear to be relatively firm (U.S.D.C. 1976) and this should have a positive of influence on DAH.

Fllet availability, vessel type, and abundance of Tanner crab are somewhat linked. Most vessels participating in the fishery are limit seine-type vessels or smaller. Hold capacity limits the ability of smaller vessels to expand into location distant from population centers. The available Tanner crab may not provide the economic basis for capitalization to larger vessels. Some of the larger vessels of 60 to 70 foot keel lengths (18.3 to 21.3 m) maintain high catches throughout the season in areas removed from population centers.

Assuming good market conditions, present fleet characteristics, and current harvest characteristics, DAH should reach 2,500,000 pounds (1,134 mt) during the 1977-78 season.

Yakutat District. The DAC has not been achieved in the past due to the same influences encountered in the Southeast district.

Fleet availability and the unknown availability of Tanner crab have negative influences on the expected DAH. More profitable fisheries with known availabilities of Tanner crab divert vessels from the Yakutat fishery, particularly from September through December.

In the past, all of Tanner crab in Yakutat have been processed in Southeastern Alaska cities or in Cordova. Running time from the fishing grounds to the various processors reduces fishing time and has had a negative influence on the DAH. One Yakutat processor has indicated a desire to process Tanner crab next season (1977-78). This could have a positive influence on expected DAH, depending on processing rates and levels.

Assuming good market conditions, the addition of a Yakutat plant to the processing sector, and sufficient vessels, the expected DAH should approach 3,000,000 pounds (1,361 mt) during the 1977-78 season.

A.6.0. OPTIMUM YIELD (OY)

A.6.1. DEPARTURE FROM MSY TO ABC FOR BIOLOGICAL REASONS

MSY and ABC are set equivalent in the absence of any biological data which would require an alternative specification.

A.6.2. DEPARTURE FROM ABC FOR SOCIO-ECONOMIC REASONS

In the absence of any explicit socio-economic objectives which would require that OY differ from the specified ABC, they are set equivalent.

A.6.3. OPTIMUM YIELD (OY)

The OY for the Southeast and Yakutat districts is 2.5 and 3 million pounds (1,134 and 1,361 mt) respectively. Total optimum yield for the Southeastern management area is therefore set at 5.5 million pounds (2,495 mt).

A.7.0. FOREIGN ALLOWABLE CATCH (FAC)

No surplus stocks are available to foreign nations from this management area.

A.8.0. MANAGEMENT REGIME

See Section 8.0 through 8.8.2.

PRINCE WILLIAM SOUND MANAGEMENT AREA

B.3.0. DESCRIPTION OF FISHERY

B.3.1. AREAS AND STOCKS INVOLVED

The Prince William Sound management area encompasses all the waters of Prince William Sound proper, and all the waters of the Northcentral Gulf of Alaska between the longitudes of Cape Suckling and Cape Fairfied (Fig. 1).

Major Tanner crab fishing areas within the Prince William Sound management area are: the eastern portion of Prince William Sound, Hinchinbrook Entrance, the area immediately east of Montague Island, the area between Cape Cleare and Cape Fairfield, the area immediately south of Hinchinbrook Island and the area west of Kayak Island.

Data are not available to determine the existence of different stocks in the management area. Thus, for management purposes, Tanner crab in the area are considered to be one stock.

B.3.2. HISTORY OF EXPLOITATION

B.3.2.1. Domestic Fishery

B.3.2.1.1. Description of User Groups

Commercial fishermen are the only user group of the Tanner crab resource in the Prince William Sound management area.

B.3.2.1.2. General Description of Fishing Effort

For the first few months of the season most of the fishing occurs inside Prince William Sound and Hinchinbrook Entrance by seine type vessels. As the season progresses and the weather conditions improve, larger vessels enter the fishery and the majority of effort shifts to the waters outside Prince William Sound.

B.3.2.1.3. Catch Trends

The fishery began in 1968 and was in an exploratory phase for the first two years with an annual catch of approximately 1.25 million pounds (567 mt). In 1970/71 a price dispute held the catch beneath 5,000 pounds (2.3 mt). The fishery reached its peak harvest in the 1972/73 season with a catch of 14 million pounds (6,350 mt). The 1974/75 season catch (4 million pounds, 1,814 mt) was suppressed by a price dispute which delayed fishing. The 1975/76 catch of 7 million pounds (3,175 mt) showed a decrease from the high seasons; however, because of the short history of the fishery it is difficult

to determine whether or not this was the beginning of a downward trend. Historical catch is shown in Table B1.

TABLE B1.—*Prince William Sound Tanner crab catch*

[Fishing season]

Seasons	Pounds	Metric tons
1968–69	1,235,613	560
1969–70	1,284,597	582
1970–71	4,159	2
1971–72	7,788,498	3,532
1972–73	13,927,868	6,316
1973–74	10,158,000	4,606
1974–75	3,854,000	1,747
1975–76	7,132,744	3,234
1976–77	2,236,000	1,014
Total	45,385,479	20,586.53
Average	5,673,185	2,573.32

Source: ADF&G catch and production.

The 1976–77 totaled only 2,236,000 pounds (1,014 mt). The recently imposed minimum size, a price dispute which delayed fishing and the exclusive registration area for Prince William Sound may have contributed to this relatively small catch.

B.3.2.1.4. Description of Vessels and Gears Employed

During the exploratory phase of the fishery (1968–70) both seine type, 40 foot (12.2 m) keel lengths, and larger crab vessels, 80 foot (24.2 m) keel lengths, fished large round, 7 foot diameter (2.13 m), Dungeness pots and rectangular king crab pots.

In 1969 7 x 7 feet (2.13 m) pyramid shaped Tanner crab pot was developed and is now used almost exclusively for this fishery.

There were 33 vessels which took part in the 1975/76 Tanner crab fishery. The average keel length was 53 feet (16.2 m), with the majority of the vessels in the 41 to 50 foot (12.5 to 15.2 m) keel length class (14 vessels) and the 61 to 70 foot class (18.6 to 21.3 m) (7 vessels). The smallest vessel had a keel length of 31.7 feet (9.7 m), and the largest keel length was 85 feet (26.2 m).

So far in the 1976/77 fishery, there are 23 vessels which have taken part in the fishery. The average keel length is 52 feet (15.8 m) with 12 of the vessels between 31 and 50 feet (9.4 and 15.2 m) and 5 vessels in the 61 to 70 foot (18.6 to 21.3 m) class.

B.3.2.2. History of Foreign Exploitation

There is no foreign fishery for Tanner crab in the Prince William Sound management area.

B.3.3. HISTORY OF MANAGEMENT

B.3.3.1. Management Institution, Policies, Jurisdictions

The State of Alaska, through the Alaska Board of Fisheries and the Cordova office, Division of Commercial Fisheries, Alaska Department of Fish and Game, is the management institution for the Prince William Sound management area.

B.3.3.2. Domestic

B.3.3.2.1. and B.3.3.2.2. Regulatory Measures and Purpose of Measures

A summary of regulatory measures is presented in Table B2. The first regulated fishing season was in 1971 when the fishery was closed for an area inside Prince William Sound between June 1 and August 31. In 1973/74 the open season was from October 15 to a closure date set by an emergency order. The opening date was based on meat recovery, while the closure was set when soft shelled crab appeared in the deliveries. For 1974/75 the season opening was moved up to November 15. In 1977 a specified closure date of May 31 based on historical appearance of soft shelled crab was set; however, an earlier closure may be enacted by an emergency order if there is unusually early occurrence of soft shelled crab.

Table B2 Major regulations by season specific to the Prince William Sound Management Area

Season	Opening and Closure	Size Limit	Guideline Harvest Level	Area Registration	Gear	Districts
1971/72	Closure of specified area within PWS from 6/1 - 8/31	None	None	None	None	None
1972/73	Oct. 15 to June 22*	None	Inside PWS 3.5 million lb. (1588 mt) Outside PWS 12.0 million lb. (5443 mt)	None	None	None
1973/74	Oct. 15 to May 31*	None	"	Exclusive	None	None
1974/75	Nov 15 to May 31*	None	"	"	None	None
1975/76	" "	None	"	"	None	None
1976/77	Nov 15 to May 10*	5.3 in (135 mm)	3 to 7 million lb. (1,360 to 3,175) metric tons	"	2 escape rings	Establish: Northern, Western, Eastern, Hinchenbrook

*Closure by emergency order when dead loss and softshells approached to 10 percent of deliveries.

Source: ADF&G Shellfish Regulations, Juneau.

Harvest of Tanner crab is limited to males only (see section 3.3.2.1. and 3.3.2.2.), and a minimum size of 5.3 inches (135 mm) was set in 1976. Based on departmental research in the Prince William Sound management area (unpublished Pr. Wm. Sound ADF&G shellfish research data) it was felt that this critical size should be set in order to protect the mature male brood stock which had been severely overharvested prior to 1976 (Pr. Wm. Sound March 1977 Report to the Board of Fisheries).

Guideline harvest levels were originally set for the 1972/73 season. The total figure of 15.5 million pounds (7,031 mt) was based on a weak estimate of what the resource might be expected to sustain.

In 1977 it was determined that the guideline harvest level of 15.5 million pounds was unrealistically high. A range of 3 to 7 million pounds (1,360 to 3,175 mt) was set to anticipate the current season's catch. This range will be adjusted each season if departmental research and early season catches warrant a change.

The Prince William Sound management area was established as an exclusive registration area starting with the 1973/74 fishing season. Vessels that register for the exclusive area may only fish that area. A vessel must declare its intent to fish the area 30 days prior to the season opening.

Exclusive registration areas are established primarily on economic considerations. The fishing fleet was composed largely of relatively small, 50 feet (15.24 m), vessels unsuitable for fishing unprotected waters. These boats were not able to compete successfully with a large mobile crab fleet such as the one based in Kodiak. A fleet of this type is capable of harvesting the available crabs in the Prince William Sound are a very rapidly if unrestricted fishing were allowed. This would leave a relatively small catch and short season for the local Prince William Sound fleet and processors.

For the 1976/77 season four districts were established within the management area. Guidelines for establishing these districts were based on the possibility of soft shell appearance not being uniform, with respect to time, over the entire area.

The only gear regulation peculiar to the Prince William Sound management area is the requirement, established prior to the 1976/77 fishery, of two escape rings of 4¾ inches (121 mm) located on the vertical plane of the pot so as to allow escapement of undersized crab from the pot. This regulation was established to reduce handling mortality and limb loss of sub-legal and female crab while they were being sorted on the decks of crab vessels. The actual size of the ring was set by determining that crab which are 5.3 inches (135 mm, the minimum legal size) in carapace width, have an average total carapace length of 4¾ inches (121 mm). Therefore, crab less than 5.3 inches (135 mm) width that move in a side to side manner could pass through these rings. Prince William Sound fishermen have found these rings to be useful in cutting down handling except for two instances: on soak times of 1 day or less, and when the gear in fished in an area where there is a very large percentage of small crab.

B.3.3.3. Foreign

No foreign fisheries.

B.3.3.4. Effectiveness of Management Measures

See section 3.3.4.

B.3.4. HISTORY OF RESEARCH

B.3.4.1. Domestic

The Department of Fish and Game Tanner crab research program did not begin until 1976. Studies completed or in progress are:

1. Size of maturity of male Tanner crab. The minimum size was determined by collecting Tanner crab in Prince William Sound and using the resulting data in determining the average size of maturity as done by Brown and Powell in 1971. One molt, the size of which was determined by Donaldson in Kodiak (Donaldson, 1977), was added to the average size at maturity which resulted in a minimum size of 5.3 inches (135 mm) (unpublished ADF&G Pr. Wm. Sound Shellfish Research).

2. Tagging to describe seasonal movement or migratory patterns.

3. Female breeding success to determine adequacy of minimum size. Preliminary analysis of the May 1977 female Tanner crab cruise conducted by ADF&G Prince William Sound shellfish research indicates that 99.8 percent of all mature females captured were bearing new egg clutches, with 91.1 percent having full clutches (unpublished Alaska Department of Fish and Game Prince William Sound Shellfish Research).

4. Index of abundance to determine recruit and pre-recruit strengths (to be initiated in August 1977).

The University of Alaska sea grant and graduate programs have:

1. Described size at maturity of female Tanner crab.

2. Described breeding success of mature females for 1973 and 1976.

B.3.4.2. Foreign

There has been no foreign research.

B.3.5. SOCIOECONOMIC CHARACTERISITCS

B.3.5.1. Output of Subject Domestic Commercial Fishery

B.3.5.1.1. Value of Catch (Ex-vessel)

The total value to the fishermen of the Prince William Sound Tanner crab fishery has ranged from a season low of $500 in 1970–71 to a high of $2,326,000 for the 1975–76 season. Total value on a yearly basis is shown in table 1. Price per pound is shown in table B3.

TABLE B3.—*Ex-vessel price of Tanner crab in the Prince William Sound management area by season*

Season	Price per pound
1966–69	$0.10
1969–70	.11
1970–71	.11
1971–72	.12
1972–73	.17
1973–74	.20
1974–75	.17
1975–76	.20
1976–77	.32

Source: Alaska Department of Fish and Game annual management reports.

B.3.5.1.2. Description and Value of Product (Wholesale)

See Table 2. The historic wholesale value of the catch is shown on Table B4.

TABLE B4.—*Wholesale value of Tanner crab in the Prince William Sound management area by year*[1]

Year	Wholesale value
1968	$10,281
1969	202,867
1970	260,110
1971	142,208
1972	1,819,317
1973	(3)
1974	3,594,927
1975	1,784,695
1976	(3)

[1]Not in season.
[2]No data available.
[3]Incomplete.

Source: Alaska Department of Fish and Game annual management reports.

B.3.5.1.3. Markets, Domestic and Foreign

Very little data is available concerning markets. In 1976 Tanner crab sections and canned meats were sold on both the United States and Japanese markets. See section 3.5.1.3.

B.3.5.2. Domestic Commercial Harvesting Characteristics

B.3.5.2.1. Total Gross Income of Fleet (From Subject Fishery and All Other Fisheries)

The gross income of the Prince William Sound Tanner crab fleet for all fisheries (King crab, salmon, halibut, etc.) was $2.2 million in 1976. This compares to a Tanner crab harvest valued at $1.2 million. The average total gross income per vessel was $56,000. Table 5 compares all management areas for 1976. Table B5 gives a historic sketch since 1968.

TABLE B5.—*Wholesale value of all fisheries in the Prince William Sound management area, by year*[1]

Year	Wholesale value
1968	$9,244,435
1969	12,953,145
1970	12,508,372
1971	15,487,929
1972	12,698,910
1973	(2)
1974	18,948,220
1975	17,958,290

[1]Not by season.
[2]No data available.

Source: Alaska Department of Fish and Game annual management report.

B.3.5.2.2. Investment in Vessels and Gear

For the 1975–76 season the total value of the 33 participating vessels is estimated at $4.5 million with an average value per vessel of $135,000.

The total value of the gear used in the 1975–76 season is estimated to be $1.3 million for 4,300 pots complete with lines and buoys. The average value of gear per vessel is $40,000. Therefore, the average value of each vessel complete with gear for 1975–76 was $175,000.

For the 1976–77 season the total value of the 23 vessels participating is estimated to be $1.7 million with the average value per vessel being $72,000.

The total value of the gear used in 1976–77 is estimated to be $550,000, an average of

$24,000 per vessel. Therefore, the average value of each vessel complete with gear is estimated to be $96,000.

B.3.5.2.3. Annual Participation in Subject Fishery

In the 1975-76 season 33 vessels fished 2,600 days (approximately 80 days per vessel).

B.3.5.2.4. Total Manpower Employed

There was an estimated 107 fishermen in the fleet in 1975-76, this dropped to 72 in 1976-77. See section 3.5.2.4.

B.3.5.2.5. Economic Viability

See section 3.5.2.5.

B.3.5.3. Domestic Commercial Processing Characteristics

B.3.5.3.1. Total Gross Income of Area Processors (From Subject and All Other Fisheries)

Wholesale value by year for all commercial species is shown on table B5. Also see section 3.5.3.

B.3.5.3.2. Investment in Plant, Equipment, Etc.

Data is not available. See section 3.5.3.2.

B.3.5.3.3. Total Employment and Labor Income

Estimated peak season employment in the processing sector was 175 for both the 1975-76 and 1976-77 seasons. See section 3.5.3.3.

B.3.5.3.4. Economic Viability

See section 3.5.3.4.

B.3.5.4. Recreational Fishing Characteristics

There is no recreational fishery for Tanner crab.

B.3.5.5. Subsistency Fishing Characteristics

There is no subsistency fishery for Tanner crab.

B.3.5.6. Indian Treaty Fishing Characteristics

No Indian treaty rights exist.

B.3.5.8. Area Community Characteristics

B.3.5.8.1. Total Population

The population of the Prince William Sound management area is shown in table 7. Cordova is the only community in the area directly involved in Tanner crab fishing and processing. A 1975 census by the city of Cordova shows a population of 2,406.

B.3.5.8.2. Total Employment (From Subject and All Other Area Fisheries)

Employment statistics are not currently available. See section 3.5.8.2.

B.3.5.8.3. Total Work Force (All Industries)

Statistics are not available. See section 3.5.8.3.

B.3.6. Interaction Among User Groups

There is no foreign fishery for Tanner crab in this area. There is a potential gear conflict between trawl fishing and Tanner crab pots.

B.3.7. Federal and State Revenues Derived From Fishery

See section 3.7. and table 9.

B.4.0. Biological Descriptors

See section 4.0.

B.4.1. Life History Features

The following life history features are known for the Prince William Sound management area:

1. Peak egg hatch period: late April and early May.
2. Average size of male and female sexual maturity: 4.3 in. (110 mm) and 3.1 in. (80 mm) carapace width respectively.
3. Period of soft shell condition: May and June (majority of adults).
4. Likelihood of spatial segregation of sexually mature male and female Tanner crab.
5. Preferred habitat: mud bottom.

B.4.2. Stock Units

Discrete stock units have not been identified.

B.4.3. Catch Effort Data

See table 1 for catch and vessel data.

B.4.4. Survey and Sampling Data

A dockside sampling program began in the 1971-72 season, but because of personnel shortages, it was not given full attention until the 1975-76 season. Prior to 1975, the only data collected was length and width frequencies and fishing area. Beginning in 1975 the sampling program was expanded to collect shell age and average weight per crab. In 1976 the program was further expanded to include data on catch per pot, days fished, and soak time.

Sampling data has shown: a decrease in the size of delivered crab from 5.7 in. (144 mm) in 1971-72 to 5.4 in. (137 mm) in 1975-76; a shift in effort from inside to outside Prince William Sound as the season progresses and weather conditions improve, and varying shell age composition of the catch depending on the area fished.

B.4.6. Quality of Data

See section 4.6.

B.4.7. Current Status of Stocks

B.4.7.1. Maximum Sustainable Yield (MSY)

Due to insufficient biological data, MSY has been estimated using historical catch data and must be considered a weak estimate due to the short history of the fishery and the methodology used.

Including the 1975-76 season, there are 8 years of catch data since the inception of the fishery in 1968. Because of minimal effort during the exploratory phases of the fishery, 1968 through 1971, and a prolonged strike which minimized effort in the 1974-75 season, these seasons are omitted from the MSY estimation. For the remaining four seasons, total seasonal catches have been adjusted by subtracting all crab landed below the new 5.3 inch (135 mm) minimum size. These adjusted totals were averaged to yield MSY (see table B6).

TABLE B6. PRINCE WILLIAM SOUND TANNER CRAB CATCH ADJUSTED FOR SIZE LIMIT.

SEASON	CATCH LBS	CATCH MT	% LESS THAN 5.3 in.	ADJUSTED CATCH LBS	ADJUSTED CATCH MT
1971/72	7,788,498	3,532	18.29	6,363,982	2,886
1972/73	13,927,868	6,316	23.57	10,645,070	4,828
1973/74	10,158,000	4,607	29.13	7,198,974	3,265
1975/76	7,132,744	3,235	36.31	4,542,845	2,060

Source: ADF&G Catch & Production

. "% less than 5.3 inches" from dockside sampling.

The maximum sustained yield for male *C. bairdi* greater than 5.3 inches (135 mm), based on an average of historical catch data, is 7 million pounds (3,175 mt).

B.4.7.2. Equilibrium Yield (EY)

Statistical data necessary to estimate EY is not available.

B.4.7.3. Acceptable Biological Catch (ABC)

The declining catch trend indicates an ABC of 3-7 million pounds (1,361-3,175 mt).

B.4.8. Estimate of Future Stock Conditions

Although no data is available to predict future stock conditions, the newly imposed minimum size for male Tanner crab should provide an adequate number of males in the breeding population allow for maximum attendance of females, and full reproduction potential.

B.5.0. Catch and Capacity Descriptors

B.5.1. Data and Analytical Approaches

B.5.1.1. Domestic

The 1975-76 season was chosen as an average year for vessel participation. Thirty-three vessels fished with an estimated total

hold capacity of 486 tons (441 mt) and an average hold capacity of 15 tons (14 mt) per vessel.

With the season running from November 15 to May 31, there were approximately 195 fishing days available. If the average vessel filled its hold, delivered, and returned to the fishing grounds every 2.5 days, the total seasonal fleet capacity would be an estimated 38,000 tons (35,000 mt).

B.5.1.2. Foreign

There is no foreign fishery for Tanner crab.

B.5.2. Domestic Annual Capacity (DAC)

The domestic annual capacity for the Prince William Sound management area is 38,000 tons (35,000 mt).

B.5.3. Expected Domestic Annual Harvest (DAH)

Assuming no adverse market conditions or major redistribution of fishing effort, the DAH is expected to be 3–7 million pounds (1,360–3,175 mt).

B.6.0. Optimum yield

B.6.1. Departure from MSY to ABC for Biological Reasons

The estimated ABC of 3–7 million pounds (1,360–3,175 mt) includes the estimated MSY, but only at the extreme of the range. Catch trends indicate that the stock may be at a level slightly lower than that capable of sustaining the long-run maximum average yield.

B.6.2. Departure from ABC for Socio-economic Reasons

In the absence of any explicit socio-economic objectives which would require optimum yield to deviate from the ABC, they are set equivalent.

B.6.3. Optimum Yield (OY)

Optimum yield is estimated to be from 3–7 million pounds (1,361 to 3,175 mt) for the 1977–78 Tanner crab fishery in the Prince William Sound management area.

B.7.0. Total Allowabel Level of Foreign Fishery (FAC)

Given the estimated MSY and DAH, the FAC for 1977–78 is zero.

B.8.0. Management Regime

See statewide section 8.0.

Cook Inlet Management Area

C.3.0. Description of Fishery

C.3.1. Areas and Stocks Involved

The target species found in this management area is *Chionoecetes bairdi*. The Cook Inlet management area has as its eastern boundary a line extending south from Cape Fairfield and as its southern boundary, a line extending east from Cape Douglas at 58° 52′ N. Latitude (Figure C1).

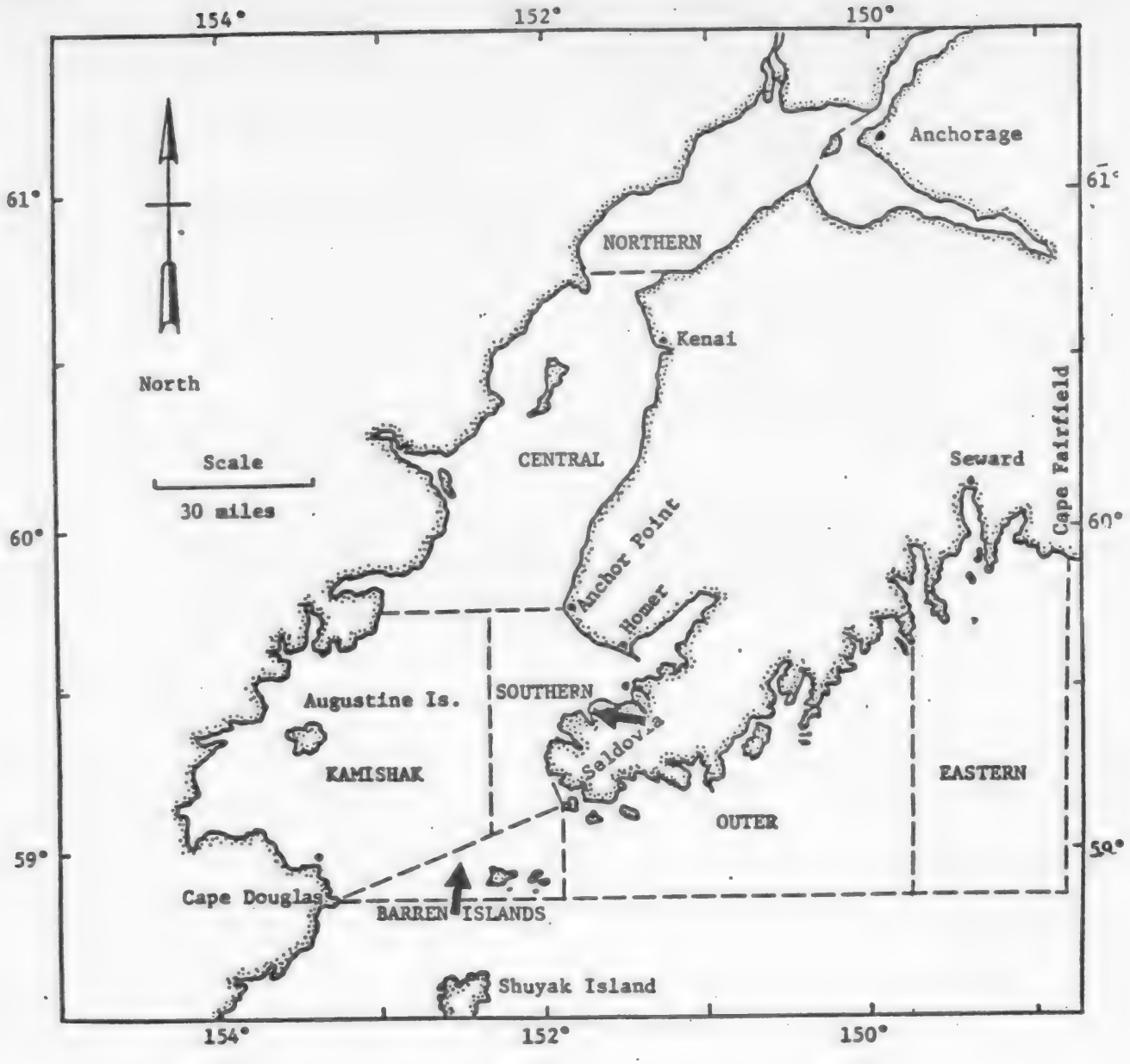


Figure C1 • Cook Inlet area district location chart.

There are three geographically distinct Tanner crab fisheries in lower Cook Inlet and along the eastern shore of the Kenai Peninsula. These areas are: (1) the Southern district fishery (Kachemak Bay), (2) the Kamishak Bay-Barren Islands fishery, and (3) the Outer-Eastern districts fishery.

C.3.2. HISTORY OF EXPLOITATION

During the initial years of the fishery, Tanner crab were taken incidentally to king crab during the open king crab season. As price and demand for Tanner crab increased in the early 1970's fishermen began directing their efforts specifically toward this species.

The first substantial effort for Tanner crab in Cook Inlet began in the late 1960's in the Southern district with harvests in the 1.0–1.5 million pound (454–680 mt) range. During the early 1970's, the Tanner crab fleet expanded into the Kamishak-Barren Islands and Outer-Eastern districts. Recent years' catches in these districts have averaged 1.5 million pounds (680 mt) in the Southern, 3.2 million pounds (1,452 mt) in Kamishak-Barren Islands and 0.75 million pounds (340 mt) in the Outer and Eastern districts.

C.3.2.1. Domestic Fishery

C.3.2.1.1. Description of User Groups

Cook Inlet Tanner crab have been exploited almost entirely by the commercial fishery. There has been an unregulated subsistence fishery which harvests less than 1,000 pounds (0.45 mt) annually.

C.3.2.1.2. General Description of Fishing Effort

Tanner crab fishing began in the late 1960's. During 1969, a total of 29 boats made 536 landings. The number of boats and landings increased until 1973 when 92 boats made a total of 1,556 landings, then dropped to 50 boats making 520 landings in 1975.

Table C1 lists Tanner crab boats, landings, and catches by year for the districts in lower Cook Inlet.

TABLE C1. TANNER CRAB BOATS, LANDINGS & CATCHES IN COOK INLET 1969-1976

Year	Boats[1]	SOUTHERN No. Land	SOUTHERN Catch 10^6lbs	SOUTHERN Catch MT	BARREN IS./ KAMISHAK No. Land	BARREN IS./ KAMISHAK Catch 10^6lbs	BARREN IS./ KAMISHAK Catch MT	EASTERN/ OUTER No. Land	EASTERN/ OUTER Catch 10^6lbs	EASTERN/ OUTER Catch MT	TOTAL No. Land	TOTAL Catch 10^6lbs	TOTAL Catch MT
1969	29	523	1.437	652	12	0.018	8	1	0.001	0.45	536	1.456	660
1970	27	298	1.153	523	13	0.070	32	8	0.106	48	310	1.329	603
1971	44	567	1.186	538	41	0.810	367	7	0.121	55	615	2.117	960
1972	56	992	2.942	1134	25	1.159	526	27	0.707	321	1044	4.808	2181
1973	92	1352	3.763	1707	146	3.488	1582	58	1.263	573	1556	8.514	3862
1974	90	897	1.129	512	182	4.641	2105	83	1.891	858	1162	7.661	3475
1975	50	374	1.130	513	105	3.151	1430	41	0.671	304	520	4.952	2246
1976[2]	72	706	1.808	827	133	3.280	1488	33	0.847	384	872	5.935	2692

Source: ADF&G Catch & Production Leaflets

1/ Total boats, some boats fish more than one district

2/ Preliminary data.

TABLE C2. COOK INLET TANNER CRAB CATCHES BY DISTRICT AND FISHING SEASON

Season	SOUTHERN 10^6lbs	SOUTHERN MT	KAMISHAK/BARREN IS. 10^6lbs	KAMISHAK/BARREN IS. MT	OUTER/EASTERN 10^6lbs	OUTER/EASTERN MT	TOTAL CATCH 10^6lbs	TOTAL CATCH MT
1968/69	1.388	630	0.012	5.4	0.001	0.45	1.401	635
1969/70	1.147	520	0.071	32	0.104	47	1.323	600
1970/71	1.047	475	0.541	245	0.003	1.4	1.591	722
1971/72	2.463	1117	0.975	442	0.805	365	4.243	1925
1972/73	2.936	1332	3.361	1525	1.267	575	7.564	3431
1973/74	1.388	630	4.689	2127	1.891	858	7.968	3614
1974/75	0.968	439	3.150	1429	0.657	298	4.118	1868
1975/76	1.339	607	3.281	1488	0.851	386	5.471	2482

Source: ADF&G Area Statistics Homer, Ak

C.3.2.1.3. Catch Trends

The first significant catches of Tanner crab were taken from the Southern District during the 1968-69 fishing season (July-June) and totaled 1.4 million pounds (635 mt, Table C2). Fishing effort spread to other stocks of Cook Inlet Tanner crab (Kamishak-Barren Islands and Outer-Eastern Districts) and peaked at 8.0 million pounds (3,629 mt) during the 1973-74 fishing season.

The Cook Inlet catch during the 1975-76 season was 5.6 million pounds (2,540 mt) with 1.4 million pounds (635 mt) from the Southern district, 3.3 million pounds (1,497 mt) from the Kamishak-Barren Islands district and 0.8 million pounds (363 mt) from the Outer-Eastern District.

These catches were all made during seasons with no size limit. The 5.5 inch (140 mm) carapace width limit was enacted starting with the 1976-77 season. In the Kamishak-Barren Islands and Outer-Eastern districts the new size limit will reduce the number of crab which can be retained from any given catch. This will not affect the Southern district since its size distribution is shifted toward large crab. (Fig. C2).

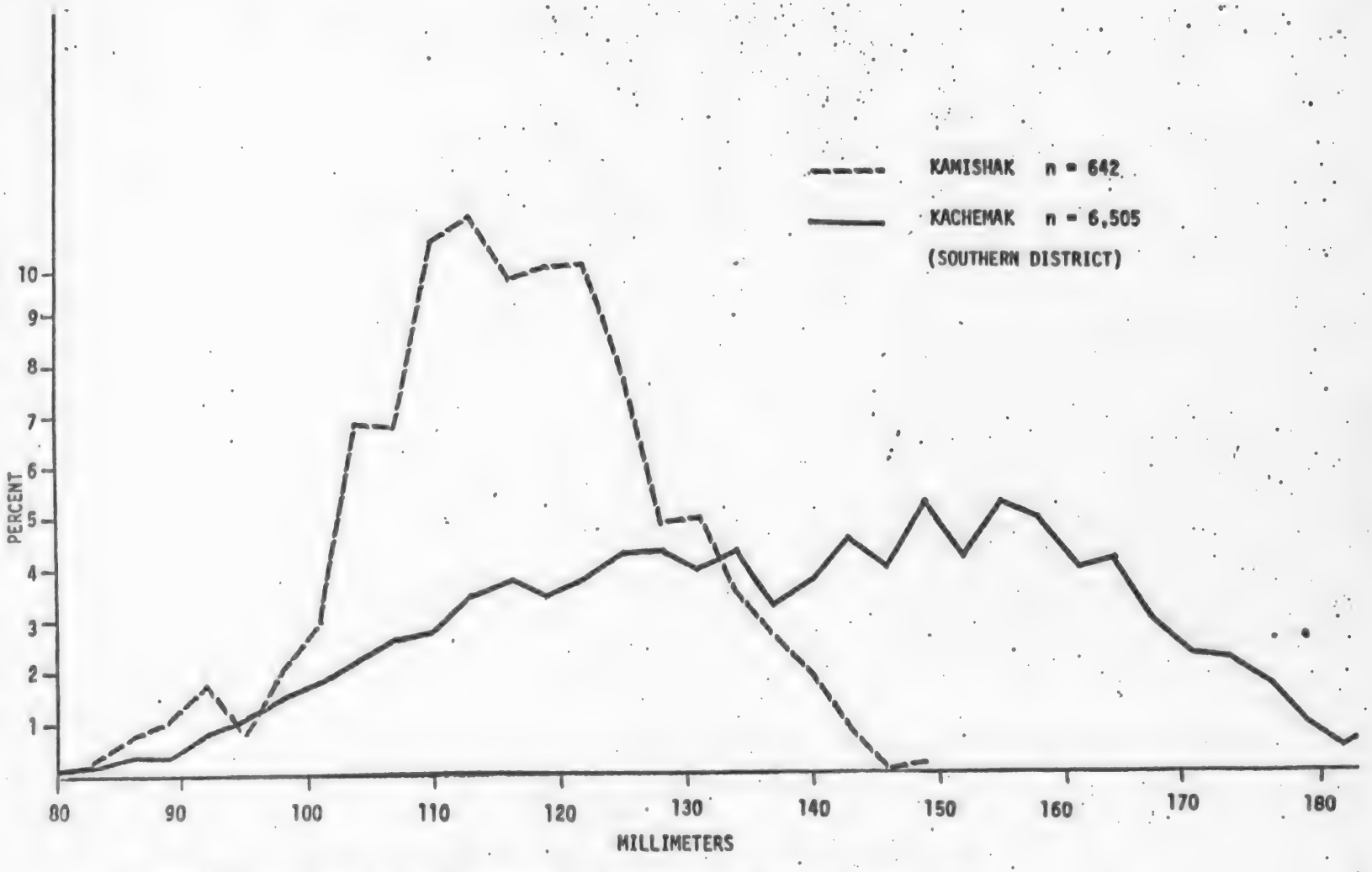


Figure C2 . Comparison of male Tanner crab width frequencies sampled during index cruises to Kamishak and Kachemak Bays in May and June 1975.

C.3.2.1.4. Description of Vessels and Gear Employed

Of the 51 boats that landed Tanner crab in the Cook Inlet area in 1975, 21 were over 50 feet (15 m) in length, live-tanked, and designed for crab pot fishing. The remaining 30 boats were converted salmon fishing boats, 30 to 50 feet in length (9 to 15m), generally without live tanks. Because of size and the lack of live tanks, smaller boats are not capable of fishing more than 1 day's travel from the processing plants. Smaller boats participate primarily in the Southern district and larger vessels fish the Kamishak-Barren Islands and Outer-Eastern districts.

The majority of the Tanner crab boats use 7x7 feet (2.1 m) king crab pots with boards installed in the tunnels to reduce the opening height to 5 inches (127 mm). Conical shaped pots have been used occasionally with limited success.

C.3.2.2. History of Foreign Exploitation

There has been no foreign exploitation of Tanner crab in waters of Cook Inlet.

C.3.3. HISTORY OF MANAGEMENT

C.3.3.1. Management Institutions, Policies, Jurisdictions

Cook Inlet Tanner crab are managed by the Alaska Department of Fish and Game. The management area is described in Section C.3.1. (also see Section 3.3.1.).

C.3.3.2. Domestic

C.3.3.2.1. and C.3.3.2.2. Regulatory Measures and Purpose of Measures

Initially the only regulatory measures employed were a males-only restriction and a measure describing crab pots and ring nets as legal methods of commercially harvesting the species. Regulatory measures are summarized in Table C3.

Table C3 . Major Regulations in Cook Inlet Tanner Crab Fisheries, 1970/71 Season to Present

Season	District	Fishing Season	Size Limit	G. H. L. Million lbs.	G. H. L. M.T.	Area Registration
1970/71	All	Aug 1-Jul 15	None	None		None
1971/72	All	Oct 1-Jun 30	None	None		None
1972/73	All	Nov 1-Jun 30	None	None		None
1973/74	Southern	Nov 1-May 29	None	None		None
	Kamishak/ Barren Is.	Nov 1-May 3	None	None		None
	Outer/ Eastern	Nov 1-Jun 7	None	None		None
1974/75	Southern	Dec 1-Jun 15	None	3.0	1361	Exclusive
	Kamishak/ Barren Is.	Dec 1-Jun 15	None	4.5	2041	"
	Outer/ Eastern	Dec 1-Jun 15	None	3.5	1588	"
1975/76	Southern	Dec 1-May 15	None	3.0	1361	Exclusive
	Kamishak/ Barren Is.	Dec 1-May 31	None	4.5	2041	"
	Outer/ Eastern	Dec 1-May 31	None	3.5	1588	"
1976/77	Southern	Dec 1-Apr 30	5.5 in.	3.0	1361	Exclusive
	Kamishak/ Barren Is.	Dec 1-May 31	5.5 in.	4.5	2041	"
	Outer/ Eastern	Dec 1-May 31	5.5 in.	3.5	1588	"

Note: There is a 75 pot limit during the open king crab season.

Source: ADF&G Shellfish Regulations

The first fishing seasons were enacted during the 1970/71 fishing year when opening/closing dates of August 1/July 15 were established. The following year (1971/72), the season was further restricted to October 1 thrugh June 30 and now opens December 1. The later date tends to increase meat yields.

Closing dates for districts have varied since 1973 from May 3 to June 30. The dates were established each year by inseason sampling in each district to determine the presence of newly molted male crab. An index program for king and Tanner crab abundances (Davis 1977) was started in the Southern district in 1974 and in the Kamishak district in 1975. Data from these programs have shown that by early June 80 perent of the male Tanner crab in the Southern district and 20 percent in the Kamishak district has recently molted. Based on these data, closing dates were established in 1977 with a May 31 closure for the Kamishak district and an April 30 closure for the rest of the districts.

The Cook Inlet management areas was established as an exclusive registration area starting with the 1974/75 fishing season. Vessels that register for an exclusive area may fish only that area. Intent to fish the exclusive area must be made 30 days prior to the season opening.

The exclusive registration area was established primarily for economic reasons. The fleet was primarily composed of small (under 50 feet, 15.24m) vessels that were not able to compete successfully with a large mobile crab fleet such as the type based in Kodiak. This type of fleet is capable of harvesting the Guideline Harvest Levels in the Cook Inlet area rapidly if allowed unrestricted fishing, leaving relatively small catch and short seasons to the local Cook Inlet fleet.

Guideline Harvest Levels were established in the Cook Inlet area beginning with the 1974-75 season. The levels are as follows:

District	Million pounds	Metric tons
Southern	[illegible]	1,361
Kamishak/Barren Islands	4.5	2,041
Outer/Estern	[illegible]	[illegible]

A size restriction on male Tanner crab was enacted for the 1976/77 fishing season. The regulation stipulates that no male crab with a shell width less than 5.5 inches (140 mm) may be taken commerically. This regulation is based on Kodiak research which indicates that the size limit asssures at least 1 year of sexual maturity before the crab become legal size.

A closed area in the Southern district has been in effect since 1973. Described as the area encompassed by a line south from Anchor Point to the intersection with a line west from the tip of Homer Spit, the closures protest molting-mating king crab from the Tanner crab fishery.

C.3.3.3. Foreign

There has been no foreign fishery.

C.3.3.4. Effectiveness of Management Measures

The exploitation of Tanner crab has a relatively short history. The 1976/77 season will be one of the first years that will see a harvest of progeny of previously exploited stocks.

One indicator suggesting that management measures are assuring a sufficient number of breeding males is the percentage of barren mature females. In the Southern district 1.9 and 0.8 percent were observed barren in June during 1975 and 1976 respectively (Davis 1977). Barren mature females in Kamishak amounted to 1.0 percent of the observed samples during July of 1976. These percentages indicate that sufficient males are available for breeding.

C.3.4. History of Research

C.3.4.1. United States

Prior to 1974, the only Tanner crab data gathered in the Cook Inlet area were commercial harvest statistics and monitoring of the catch length frequencies, average weights, catch per pot and the incidence of recently molted crab.

A pot index program for king and Tanner crab aboundances was initiated in 1974 in the Southern district and 1975 in the Kamishak district. Methodology and results are described in Davis (1977). The program involves fishing standardized pots in a systematic sampling design during similar tie periods each year and comparing relative catch results.

Beginning in 1977 monthly bottom trawl surveys for Tanner and king crab were started in the Southern district to sample depth distribution and condition of the stocks.

C.3.4.2. Foreign

There has been no known foreign research on Tanner crab stocks in Cook Inlet.

C.3.5. Socio-Economic Characteristics

C.3.5.1. Output of Subject Domestic Commercial Fishery

C.3.5.1.1. Value of Catch (Ex-vessel)

The annual ex-vessel value of Tanner crab harvested in Cook Inlet has ranged from $158,000 in 1969 to $1.5 million in 1974, in 1976 it was approximately $1.3 million (Table 1). The price per pound to the fishermen has ranged from 10 cents in 1969 to 34 cents in January 1977.

C.3.5.1.2. Description and Value of Produce (Wholesale)

Tanner crab are processed into either frozen meat or sections.

The wholesale value of the Cook Inlet pack was $7.0 million in 1973. During 1974 and 1975 the value was approximately $2.8 million. Value for 1976 is not available. Tables 2 and 3 show 1975 product values.

C.3.5.1.3. Markets, Domestic and Foreign

The pack is marketed in both the domestic and export markets. See section 3.5.1.3.

C.3.5.2. Domestic Commercial Harvesting Characteristics

C.3.5.2.1. Total Gross Income of Fleet (From Subject Fishery and All Other Fisheries)

During 1975 51 boats caught $800,000 worth of Tanner crab in Cook Inlet. The average gross income per boat was $15,800 and ranged from $10 to $87,000. Seventeen of the 51 vessels landed more than $10,000 of Tanner crab in 1975.

The majority of vessels in the 1975 Tanner crab fishery also fished in other commercial fisheries; 44 fished king crab, 16 Dungeness crab, 21 salmon, 5 shrimp (either pot or trawl gear) and 3 herring.

Boats fishing king crab averaged $33,000, those in the Dungeness fishery averaged $7,000.

The gross income for all fisheries (king crab, salmon, halibut, etc.) was $7.3 million in 1976, compared to a Tanner crab harvest of $1.2 million. The average total gross income per vessel was $101,600. Table 5 compares all management areas for 1976.

C.3.5.2.2. Investment in Vessels and Gear

No information available. See section 3.5.2.2.

C.3.5.2.3. Annual Participation in Subject Fishery

An estimated 1,715 vessel days were utilized in the Tanner crab harvest during 1976. This estimate is based on 1 day fishing per landing in the southern district, 7 days in the Kamishak-Barren Islands, and 4 days fishing per landing in the Outer-Eastern districts.

C.3.5.2.4. Total Manpower Employed

An estimated 165 fishermen participated in the Tanner crab fishery during 1975. Labor payments are not available. See section 3.5.2.4.

C.3.5.2.5. Economic viability

No information available. See section 3.5.2.5.

C.3.5.3. Domestic Commercial Processing Characteristics

There are four major Tanner crab processing facilities in the Cook Inlet area. the two plants in Homer and one cannery in Seward process section crab while the plant in Seldovia usually packs a straight meat product.

The processing capacity of the four plants operating in Seldovia, Seward, and Homer is 170,000 pounds (77.1 mt) per day (10-hour shift). There are also several hand pack facilities in the Homer area which produce whole or sectioned crab to the southcentral Alaska fresh seafood markets, primarily in the Anchorage area.

C.3.5.3.1. Total Gross Income of Area Processors

In 1976, the estimated wholesale value of the Tanner crab pack totaled $4.3 million for the four major and two minor processors.

During the same year the wholesale value of shrimp, king crab, and Dungeness crab totaled $1.642, $6.348, and $0.091 million respectively. Some of the processors also operate on finfish. See section 3.5.3.1.

C.3.5.3.2. Investment in Plant, Equipment, Etc.

No information is available. See section 3.5.3.2.

C.3.5.3.3. Total Employment and Labor Income

The four major plants have employed an average of 250 workers processing Tanner crab since 1970 in Cook Inlet. These plants also process king crab. See section 3.5.3.3.

No estimates are available concerning labor income.

C.3.5.3.4. Economic Viability

No information is available. See section 3.5.3.4.

C.3.5.4. Recreational Fishing Characteristics

There are no regulated recreational or sport fisheries for Tanner crab in Cook Inlet.

C.3.5.5. Subsistence Fishing Characteristics

Subsistence fishing for Tanner crab in Cook Inlet is open year-round with no sex, size, or gear restrictions except that explosives or chemicals may not be used. Subsistence caught crab may not be sold or bartered. subsistence fishermen must inscribe their name and address on their buoys.

At times, as many as 100 pleasure boats engage in the southern district fishery. Information concerning actual total harvest is not available; it is estimated that the catch is minimal.

C.3.5.6. Indian Treaty Fishing Characteristics

There are no Indian treaty fishing rights.

C.3.5.8. Area Community Characteristics

C.3.5.8.1. Total Population

The populations of communities directly involved in Tanner crab harvesting and processing are as follows: Homer trade area—4,500; Seward—2,200; and Seldovia—600. (Data source: City Clerks April 1977). Management area comparisons for 1976 are shown in Table 7.

C.3.5.8.2. Total Employment (From Subject and Other Area Fisheries)

It is estimated that 300 workers participate in Tanner crab processing at peak periods. No estimates are available of workers involved in related activities.

C.3.5.8.3. Total Work Force (All Industries Including Fisheries)

See Section 3.5.8.3.

C.3.6. Interaction Among User Groups

A conflict exists between Tanner crab gear and shipping in the Southern district. Voluntary shipping lanes have been established in the district. However, in some instances ships have not complied with the lanes and cut off, dragged, or entangled Tanner crab pot lines and buoys. Some fishermen are reported to have lost as many as 25 pots during one year.

Another minor conflict occurs between shrimp trawl and Tanner crab pot fishermen. In most cases the fishermen are able to maneuver around pots but on occasion pots are dragged away from their original fishing location.

C.3.7. Federal State Revenues Derived From Fishery

These values were estimated for the total state harvest and reported in Section 3.7.

C.4.0. Biological Descriptors

C.4.1. Life History Features

The general life history of Tanner crab is described in the statewide portion of this report, Section 4.1.

C.4.2. Stock Units

There are three Tanner crab stock units within the Cook Inlet area that are separated geographically. These units are the Southern or Kachemak Bay stock, the Kamishak-Barren Island stock and the Outer-Eastern stock. The Outer-Eastern stock is harvested primarily from Harris Bay, Outer Resurrection Bay, and Day Harbor.

C.4.3. Catch Effort Data

Catch sampling is conducted at delivery points in Homer, Seldovia, and Seward. Interviews with fishermen determine areas fished, number of pots pulled, average weight of crab landed, and other pertinent information. A sample of the landing is measured for width frequency.

The unstandardized (e.g. soak times are not consistent) catch per pot and average weight by month for the Southern and Kamishak districts are listed in Tables C4 and C5. There are no data for the Outer-Eastern district.

TABLE C4. CATCH, AVERAGE CATCH PER POT (unstandardized) AND AVERAGE WEIGHT OF TANNER CRAB CAPTURED IN THE COMMERCIAL FISHERY OF COOK INLET'S SOUTHERN DISTRICT. 1974/75 SEASON TO PRESENT.

	1974/75					1975/76					1976/77[1/]				
	Catch		No.	Avg. Wt.		Catch		No.	Avg. Wt.		Catch		No.	Avg. Wt.	
Month	10^3lbs	MT	Per Pot	Lbs.	KG	10^3lbs	MT	Per Pot	Lbs.	KG	10^3lbs	MT	Per Pot	Lbs	KG
December	29	13	3.42	3.26	1.48	191	87				660	299	16.23	2.85	1.29
January	76	34	3.56	3.08	1.40	236	107	2.53	2.94	1.33	689	313	15.97	2.83	1.28
February	54	25		3.00	1.36	360	163	9.24	2.75	1.25	408	185	9.57	2.91	1.32
March	209	95	14.63	2.85	1.29	172	78	14.7	2.55	1.16	178	81	11.27	2.65	1.20
April	313	142	25.14	2.88	1.31	399	181	21.74	2.42	1.10					
May	260	118	21.8	2.68	1.22	96	44	29.28	2.18	0.99					
June	25	11													
Weighted Ave.			18.94	2.85	1.29			12.68	2.65	1.20			14.27	2.84	1.29

1/ Incomplete season

Source: ADF&G dockside samples

TABLE C5. CATCH, AVERAGE CATCH PER POT (unstandardized) AND AVERAGE WEIGHT OF TANNER CRAB CAPTURED IN THE COMMERCIAL FISHERY OF COOK INLET'S KAMISHAK/BARREN ISLANDS DISTRICTS. 1974/75 SEASON TO PRESENT.

	1974/75					1975/76					1976/77[1/]				
Month	Catch 10^3lbs	Catch MT	No. Per Pot	Avg. Wt. Lbs.	Avg. Wt. KG	Catch 10^3lbs	Catch MT	No. Per Pot	Avg. Wt. Lbs.	Avg. Wt. KG	Catch 10^3lbs	Catch MT	No. Per Pot	Avg. Wt. Lbs	Avg. Wt. KG
December						1	0.45								
January						5	2.3				1				
February						16	7.3				61				
March						199	90	21.8	2.51	1.14	210		25.75	2.35	1.07
April	1032	468	116.19	2.04	0.93	1291	586	86.09	2.20	1.00					
May	1596	724	115.73	1.98	0.90	1765	801	86.68	2.06	0.94					
June	523	237	85.25	1.68	0.76										
Weighted Avg.			110.82	1.95	0.89			82.07	2.14	0.97					

1/ Incomplete season

Source: ADF&G dockside samples

Catch per pot information from the Southern district has remained relatively consistent for 3 years. It is anticipated that the 1976–77 catch per pot of legal sized crab in the Kamishak district will be less than the previous two seasons due to the new size limit restrictions.

C.4.4. Survey and Sampling Data

Relative abundance indices of Tanner crab in the Southern district are made concurrent with the king crab indexing program for the years 1974–1976 (Davis, 1977). The standardized index catch per pot of legal male Tanner crab was 16.2, 19.6, and 9.6 respectively. These data indicate a reduction during the 1976 cruise which may be the result of a weak recruit class.

One thousand carapace dart tagged legal Tanner crab were released in the Southern district just prior to the 1976–77 commercial season. By April 1977, 48 percent of the tags had been returned by commercial fishermen. The harvest at that time totaled 1,950,000 pounds (885 mt). Based on a Peterson mark-recapture estimate (Ricker 1975) a total of 1.426 million legal crab (±65,000 at 67 percent confidence) weighing 4 million pounds (1,814 mt) were available for harvest beginning in December 1976 in the district.

Another indicator of stock status is the percentage of mature barren females in the population. Observations in both the Southern and Kamishak districts have shown that less than 2 percent are barren.

C.4.6. Quality of Data

Fishery monitoring information from the Kamishak and Southern districts is relatively complete. Abundance surveys have been conducted in the Southern district since 1974. Information from other districts is limited. See Section 4.6.

C.4.7. Current Status of Stocks

C.4.7.1. Maximum Sustainable Yields (MSY)

The average catch of Tanner crab in Cook Inlet for the past four seasons has been 6.3 million pounds (2,858 mt). Catches have ranged from 4.1 million pounds (1,860 mt) to 8 million pounds (3,629 mt), no size limit. The average catch of crab larger than 140 mm carapace width would have been 5.3 million pounds (2,404 mt). Lacking other data, a weak estimate of MSY is 5.3 million pounds (2,404 mt).

C.4.7.2. Equilibrium Yield (EY)

There is no data base to develop an EY estimate.

C.4.7.3. Acceptable Biological Catch (ABC)

Based upon historic catch levels the ABC is set at 5.3 million pounds (2,404 mt).

C.4.8. Estimate of Future Stock Conditions

Future stock abundance cannot be predicted with any degree of accuracy. Gross indicators suggest the reproductive potential of the stock is good.

C.5.0. Catch and Capacity Descriptors

C.5.1. Data and Analytical Approaches

C.5.1.1. Domestic

Table C2 contains the historic catch for Cook Inlet. Tables 4 and 11 give a description of the Cook Inlet fleet and its capacity.

C.5.2. Domestic Annual Capacity (DAC)

The Cook Inlet DAC (seasonal live tank capacity) is estimated at 38 million pounds (17,237 mt).

C.5.3. Expected Domestic Annual Harvest (DAH)

Assuming no adverse market conditions or major redistribution of fishing effort, the 1977–78 DAH is expected to be 5.3 million pounds.

C.6.0. Optimum Yield (OY)

C.6.1. Departure From MSY to ABC for Biological Reasons

The ABC for the Cook Inlet management area, in the absence of any biological information that would dictate otherwise, is set equivalent to MSY.

C.6.2. Departure From ABC for Socio-economic Reasons

In the absence of any explicit socio-economic objectives which would require the optimum yield to deviate from the ABC, they are set equivalent.

C.6.3. Optimum Yield (OY)

The optimum yield is set at 5.3 million pounds (2,404 mt) for the 1977–78 season in Cook Inlet.

C.7.0. Total Allowable Level of Foreign Fishery (FAC)

Given the estimated MSY and DAH, the FAC for 1977–78 is zero.

C.8.0. Management Regime

See statewide section 8.0.

Kodiak Management Area

D.3.0. Description of Fishery

D.3.1. Area and Stocks Involved

The target species is *C. bairdi* in the Kodiak management area. This area consists of the Pacific Ocean waters south of the latitude of Cape Douglas, west of 150° W. longitude and east of the longitude of Cape Kumlik (157°27′ W. longitude). See Figure 1.

D.3.2. History of Exploitation

From the initial harvest in 1967, the Tanner crab fishery slowly expanded through 1972 with harvest levels increasing to 9.5 million pounds (4,309 mt) in the 1971–72 season (Table D1). Areas fished initially were the inshore bays and nearshore waters of the east and west side of Kodiak Island with the harvest before 1970 usually incidental to the king crab fishery or as a supplemental income source during the winter and spring months. Increasing restriction on king crab seasons due to reduced population levels speeded development and processing interest in Tanner crab. Late winter and spring months (February–May) were the most productive periods, though the fishery was legally open the entire year with the exception of a 2-week closure prior to the opening of king crab season, August 15.

Table D1 Historic commercial catch and effort of Tanner crab in the Kodiak Management Area, 1967-1977[1/]

Calendar Year	Fishing Year	No Vessels	Catch Pounds	Catch MT	No. Landings	Unweighted mean Catch/Landings Pounds	Unweighted mean Catch/Landings MT	No. Pot Lifts	Ave. No. Crab/Pot
1967			110,961	50.33	83	1,337	.61		
1968			2,560,687	1,161.51	817	3,134	1.42		
1969		85	6,827,312	3,096.82	955	7,149	3.24	72,748	43
	1969-72[2]	67	8,416,782	3,817.79	833	10,104	4.58	78,266	42
	1970-71	82	6,744,163	3,059.10	453	14,888	6.75	60,967	44
	1971-72	46	9,475,902	4,298.20	505	18,764	8.51	65,907	59
	1972-73	105	30,699,777	13,925.20	1,466	20,941	9.50	188,158	67
	1973-74[3]	123	29,820,899	13,526.55	1,741	17,129	7.77	217,523	59
	1974-75[3]	74	13,649,969	6,191.53	471	28,981	13.15	73,826	83
	1975-76[4]	104	27,336,911	12,399.83	1,168	23,405	10.67	199,304	64
	1977[5]	98	21,000,000	9,525.54	950	22,105	10.03	150,539	48
TOTAL (FISHING YEARS)		699	147,144,403	66,743.74	7,587	-	-	1,034,490	-
AVERAGE (FISHING YEARS)		87	18,393,050	8,342.97	948	19,540[6]	8.86[6]	129,311	(weighted avg) 59.4

[1] Data Source: Alaska Department of Fish and Game Annual Board of Fish and Game Reports and Annual Kodiak Area Mgmt. Report.
[2] Fishing year July 1 - June 30.
[3] Legal season November 1 - June 30. Season terminated May 15 due to onset of mating period.
[4] Legal season November 1 - April 30.
[5] Legal season January 1 - April 30 (catch and effort projected)
[6] Weighted averages.

In 1973, a major expansion of the fishery took place due to an extremely short king crab season and favorable Tanner crab marketing conditions. The catch reached 30.7 million pounds (13,926 mt) for the 1972–73 fishing season. This harvest and the discovery of large untapped offshore stocks established Tanner crab as a principal winter-spring fishery providing fishermen with an earning potential similar to the king crab fishery. By 1975, the offshore area of Cape Ikolik to Chirikof Island, Portlock Banks, Shelikof Strait, Chiniak Gully and Albatross Bank were mostly explored. Many of these areas yielded large quantities of Tanner, with numerous loads averaging 3.0 pounds (1.36 kg) per crab.

Commercial harvests totaled 29.8 million pounds (13,526 mt) during the 1973–74 season, 13.6 million pounds (6,169 mt) in the 1974–75 season, and 27.3 million pounds (12,383 mt) in the 1975–76 season.

The 1977 season (January–April) in the Kodiak area had a guideline harvest range of 15 to 25 million pounds (6,804 to 11,340 mt) and a harvest of 20.7 million pounds (9,399 mt).

D.3.2.1. Domestic Fishery

D.3.2.1.1. Description of User Groups

The user group in the Kodiak area Tanner fishery is made up primarily of commercial fishermen. This group is composed of 90 Alaskan residents and 8 nonresident vessel captains. An insignificant subsistence fishery for Tanner crab exists with the catch being less than 10,000 pounds (4.5 mt) annually.

D.3.2.1.2. General Description of Fishery Effort

Fishing effort was incidental to the established king crab fishery prior to the early 1970's. Tanner crab were harvested on a part-time basis during this period with markets slow to develop. Effort data (number of vessels, pots lifted and landings) are available starting with the 1969–70 fishing season (Table D1). For the 1969–70 through 1971–72 seasons an average of 65 vessels fished. Catches ranged from 6.7 to 9.5 million pounds (3,039 to 4,309 mt). Landings averaged about 600 per season with an average of 68,400 pot lifts made yearly. Beginning with the 1972–73 season, a major expansion took place with a total harvest of 30.7 million pounds (13,926 mt) caught by 105 vessels making 1,466 landings and 188,000 pot lifts. The fishery has continued to maintain a similar effort level through the 1977 season with the exception of the 1974–75 season when prolonged price negotiations limited the fishing effort to approximately one-half the normal seasonal effort.

Since 1972, market development and resulting improvements in ex-vessel price has contributed substantially to increasing both vessel effort and size as a character of the fleet.

D.3.2.1.3. Catch Trends

The first year of harvest occurred in 1967 with a catch of 111,006 pounds (50.33 mt). commerical harvest peaked during the 1972–73 fishing season when 30.7 million pounds (13,925 mt) were taken. Though catches have fluctuated since the peak year, the annual harvest for all fishing seasons since the 1969–70 season has averaged 18.4 million pounds (8,356 mt). Since the 1972–73 season when effort, markets, and exploration developed a more fully exploited fishery, the average annual harvest has been 24.5 million pounds (11,114 mt). Starting with the 1972–73 season, a guideline harvest range of 25–30 million pounds 11,340 to 13,608 mt) was established. For the 1977 season, a statewide (with the exception of Prince William Sound) minimum size of 5.5 inches (140 mm) was set. After adjusting the harvest levels in light of this minimum size, a harvest range of 15–25 million pounds (6,804 to 11,340 mt) was set for the 1977 season. Existing stock conditions and catch per unit of effort data indicate that seasonal harvest levels can be sustained in the upper end of the range during the 1978 season (January–April). The catch history is documented in Table D1.

D.3.2.1.4. Description of Vessels and Gear Employed

Historically, the Kodiak Tanner crab fisery has been conducted by salmon limit seiners, small steel hulled vessels and large wood hulled vessels. However, during the past 4–5 years, many newly constructed vessels have entered the fleet. In many cases, these are large steel hulled "combination" vessels capable of trawl and pot fishing. They are also capable of ranging to offshore grounds and harvesting stocks not available to smaller local vessels. Generally, these larger vessels are 60–120 feet (18 to 37 m). The 1977 season fleet (active vessels) averaged 56 feet (17 m) with vessels ranging from 30 to 134 feet (9 to 41 m). Average net tonnage for the fleet is 68 tons (62 mt) with vessels ranging from 3.5 to 197.5 net tons (3.2 to 179.2 mt). Average hold capacity of the 1977 season fleet (per vessel) is 39,000 pounds (17.7 mt).

Gear used in the Tanner fishery consists mainly of conventional rectangular king crab pots with modified tunnel entrances (92 percent) ranging in size from 5x5 feet (1.5 m) to 8x8 feet (2.4 m) pots. Fifty percent of this gear is composed of 7x7 feet (2.1 m) gear. Pyramid style pots composed only 7.2 percent of the total gear used and Japanese longline conical pots constitute the remaining 1 percent. Total gear fished is 9,000 pots as indicated from a fleet survey during the 1977 season.

D.3.2.2. History of Foreign Exploitation

No foreign fishery for Tanner crab exists in the Kodiak management area.

D.3.3. History of Management

D.3.3.1. Management Institutions, Policies, Jurisdictions

The Kodiak management area is defined in Section D.3.1. The Division of Commercial Fisheries within the Alaska Department of Fish and Game exercises management control of the fishery and maintains historical catch and production records at the headquarters in Juneau. Inseason management responsibility, preliminary development of management planning and management related research is conducted out of the regional ADF&G office in Kodiak.

D.3.3.2. Domestic

D.3.3.2.1 and D.3.3.2.2. Regulatory Measures and Purpose of Measures

When the Tanner crab fishery began in 1967, there were no restrictions except for the definition of gear that could be used, i.e. pots, ring nets and diving gear. As the fishery developed and effort increased, seasons, size limits, and harvest guidelines were established (Table D2).

TABLE D2. Historical Development Of Regulatory Measures For Kodiak Management Area Tanner Crab.

YEAR	SEASON[1/]	GUIDELINE HARVEST LEVEL	AREA REGISTRATION	SIZE	GEAR
1967	None	None	None	None	Pots, ring nets and diving gear
1968	None	None	None	None	Same plus tunnel height to 4"
1969	1/1-7/31 & 8/15-12/31	None	None	None	"
1970	"	None	None	None	"
1970/71	8/15-7/31	None	None	None	"
1971/72	"	None	None	None	"
1972/73	"	None	None	None	"
1973/74	2/	30 10^6lbs 3/ (13 608 MT)	None	None	"
1974/75	2/	"	None	None	Same except tunnel to 5".
1975/76	11/1 - 6/30	24-30 10^6lbs (11340-13608 MT)	None	None	"
1976/77	1/1 - 4/30	15-25 10^6lbs (6804-11340 MT)	None	5.5 in. (140mm)	"

1/ Seasons may have closed early by emergency order.

2/ North of the latitude of Cape Barnabas and east of the longitude of the northern tip of Shuyak Island: from November 1 through June 30:

North of a line from Cape Ikolik to Kilokak Rocks and west of the longitude of the northern tip of Shuyak Island: from November 1 through June 30;

South of the latitude of Cape Barnabas and south of line from Cape Ikolik to Kilokak Rocks: from January 1 through June 30.

3/ Levels for 1973/74 through 1975/76 are "departmental guidelines" not in the regulation booklets.

Source: ADF&G Shellfish Regulations, Juneau.

Fishing season. Starting in 1969, the season was set from January 1 through July 31, and August 15 through December 31. The two week closure was to provide for an orderly transition into the king crab season that began August 15. By 1973/74, effort levels, rates of harvest, and accumulating biological information combined to shorten the season to November 1 through June 30. However, it became apparent that mating crab and newly molted males were being taken with increasing frequency. Therefore, the 1973/74 season was terminated May 15. The 1974/75 season ran approximately the same time, November 1 through May 31. In the 1975/76 season fishing was allowed from November 1 through April 30 since research information indicated May as one of the peak months of reproductive activities. The current season (1977), was further adjusted to January 1 due to processors' requests to harvest crab during periods of greatest meat recovery.

Guideline harvest levels. During the 1973/74 season the first guideline harvest level was established: not to exceed the 1972/73 harvest of 30.7 million pounds (13,925 mt). The 1974/75 season harvest was reduced by market conditions. The 1975/76 guideline harvest range was 25 to 30 million pounds (11,340 to 13,608 mt). Data gathered from Tanner crab research indexing efforts plus a new size limit was used to establish an area guideline harvest level of 15 to 25 million pounds (6,804 to 11,340 mt).

Size limits. Results of growth per molt studies and size at maturity provided the basis for the 5.5 inch (140 mm) minimum size limit on male Tanners established the 1977 season. Prior to this time no size limit had been imposed on the fishery. See section 3.3.2.2 for purpose and rationale of the 5.5 inch (140 mm) size limit.

Gear. Pots, ring nets and diving gear have constituted legal gear for commerical harvesting of Tanner crab since the fishery's beginning in 1967. In 1968 a tunnel entrance not more than 4 inches (102 mm) was set. In 1974 this was changed to not exceed 5 inches (127 mm). These tunnel restrictions allow Tanner crab free access to a pot while keeping out most larger king crab, thus reducing sorting and handling mortality.

Sex limitation. Only male Tanner crab may be legally harvested. See section 3.3.2.2. for the purpose and rationale of this regulation.

D.3.3.3. Foreign

There is no foreign fishery in the management area.

D.3.3.4. Effectiveness of Management Measures

The recent implementaton of management measures has not allowed sufficient time for them to be evaluated as to their long-term effectiveness. It appears that Tanner crab in the Kodiak management area have not been over exploited by past fishing and that current regulations will adequately protect breeding stock and maintain the general stock health.

D.3.4. History of Research

See Section 3.4.

D.3.5. Social-Economic Characteristics

D.3.5.1. Output of Subject Domestic Commercial Fishery

D.3.5.1.1. Value of Catch (Ex-Vessel)

From 1967 through 1975, ex-vessel value of the Kodiak Tanner catch fluctuated from 7 to 20 cents per pound. Increased demand for Tanner crab sections and meat in U.S. and foreign markets raised the 1977 seasonal price to 34 cents. The 1977 harvest of 20.7 million pounds (9,399) was valued at $7,038,000 and is the greatest value in the history of the Kodiak fishery.

D.3.5.1.2. Description and Value of Product (Wholesale)

See section 3.5.1.2.

D.3.5.1.3. Markets, Domestic and Foreign

See section 3.5.1.3.

D.3.5.2. Domestic Commerical Harvesting Characteristics

See section 3.2.1.4.

D.3.5.2.1. Total Gross Income of Fleet

The gross income of the Kodiak Tanner crab fleet for all fisheries was $18.5 million in 1976. This compares to a Tanner crab harvest valued at $5 million. The average total gross income per vessel was $175,700. Table 5 compares all management areas for 1976.

D.3.5.2.2. Investment in Vessels and Gear

This information is not available for the Kodiak management area. See section 3.5.2.2.

D.3.5.2.3. Annual Participation in Subject Fishery

Data for the 1975/76 fishing season indicates 1,168 landings were made. The 1977 season produced 998 landings. Based on an estimated 5 vessel days per trip, 5,840 and 4,990 vessel days were expended respectively. The number of vessels and effort exerted in the fishery appears in Table D1.

D.3.5.2.4. Total Manpower employed

Employment: harvest and processing sectors. During the 1975/76 season, the estimated employment in the harvesting and processing sectors in the Kodiak management district was 400 to 1,500 persons respectively during the peak of the season.

D.3.5.2.4. Total Manpower Employed

Employment: harvest and processing sectors. During the 1975/76 season, the estimated employment in the harvesting and processing sectors in the Kodiak management district was 400 to 1,500 persons respectively during the peak of the season.

D.3.5.2.5. Economic Viability

Data not available. See section 3.5.2.5.

D.3.5.3. Domestic Commercial Processing Characteristics

D.3.5.3.1. Total Gross Income of Area Processors

Data not available. See section 3.5.3.1.

D.3.5.3.2. Investment in Plant, Equipment, Etc.

Data not available. See section 3.5.3.2.

D.3.5.3.3. Total Employment and Labor Income

Average seasonal employment by Kodiak area processors is estimated to be 1,500. Labor income is not available. See section 3.5.3.3.

D.3.5.3.4. Economic Viability

Data not available. See section 3.5.3.5.

D.3.5.4. Recreational Fishing Characteristics

No regulated sport fishery exists in the Kodiak management area for Tanner crab.

D.3.5.5. Subsistence Fishing Characteristics

A Tanner crab subsistence fishery of minor significance exists with total annual catch not exceeding 10,000 pounds (4.5 mt). Principal gear is ring nets. Crab are also taken for subsistence incidentally while fishing for other commercial species.

D.3.5.6. Indian Treaty Fishing Characteristics

No Indian treaty rights exist.

D.3.5.8 Area Community Characteristics

D.3.5.8.1. Total Population

Kodiak	[1]7758
Port Lions	[2]227
Quzinkie	[1]160
Port Williams	[1]44
Karluk	[1]98
Larsen Bay	[1]109
Akhiok	[1]115
Old Harbor	[2]290
Total population Kodiak Island	8801

[1]Estimated 1977—including military.
[2]1970.

Table 6 shows the yearly total population since 1970.

D.3.5.8.2. Total Employment

Data not available. See section 3.5.8.2.

D.3.6. Interaction Among User Groups

With the exception of the very minor subsistence fishery, the only users of the Tanner crab resource in this management area are U.S. commercial fishermen.

D.3.7. Federal and State Revenues Derived from Fishery

See section 3.7 and Table 9.

D.4.0. Biological Descriptors

D.4.1. Life History Features

See General Life History, section 4.1 for description of biological characteristics of Tanner crab.

D.4.2. Stock Units

Stock units in the Kodiak area are not well defined at this time. However, established fishing grounds, tag release and recovery data, and preliminary analysis from the king crab population assessment studies (captured Tanners were recorded and analyzed) indicate stock differentiation.

D.4.3. Catch Effort Data

Table D1 contains historical catch and effort data for the Kodiak area.

D.4.4. Survey and Sampling Data

ADF&G management sampling data consists of vessel interviews, dockside width frequency samples, crab tag recovery and logbook information (no logbooks in 1977). Research data on Tanner crab, (including sex, age, and size composition, tagging studies,

fecundity and distribution, was conducted during the 1971-76 Kodiak area king crab population studies. Life history studies on growth, size at maturity, mating and seasonal timing of mating have been conducted by research biologists within the management area from 1973 to present.

D.4.6. Quality of Data.

See section 4.6.

D.4.7. Current Status of Stocks

D.4.7.1. Maximum Sustainable Yield (MSY)

Because of insufficient research data, no estimate of MSY can be developed using generally accepted population dynamics models. However, a weak estimate of a MSY of 21.5 million pounds (9,752 mt) has been derived by using the average catch of 25.1 million pounds (11,385 mt) for the seasons 1972/73 through 1975/76 reduced by the portion of the catch (14 percent) which was under 5.5 inches (140 mm).

Analysis of commercial catch and assessment data obtained during 4 years of intensive fishing prior to the 1977 season when the average catch was 25.1 million pounds (11,385 mt) indicates that the current exploitation level has not significantly affected brood stock capacity or caused an overall sharp decline in crab abundance.

D.4.7.2. Equilibrium Yield (EY)

Data sufficient to estimate the equilibrium yield are not available.

D.4.7.3. Acceptable Biological Catch (ABC)

Based upon the average catch since the 1972/73 season and current biological information, an acceptable biological catch of 15 to 25 million pounds (6,804 to 11,340 mt) has been established.

D.4.8. Estimates of Future Stock Conditions

Future Tanner crab stock conditions cannot accurately be determined until a more detailed stock assessment study is completed covering all major area stocks. Available data suggest general healthy stock conditions capable of supporting current production levels.

D.5.0. Catch and Capacity Descriptors

D.5.1. Data and Analytical Approaches

D.5.1.1. Domestic

Harvesting and processing capacities are listed in Tables 6 and 11 for the 1977 season. The number of vessels is calculated from fish ticket information. Information on capacities was collected through vessel interviews. Processing information was gathered from ADF&G annual reports and interviews with plant managers.

D.5.1.2. Foreign

There is no foreign fishery in the Kodiak area.

D.5.2. Domestic Annual Capacity (DAC)

The DAC is estimated at 38,000,000 pounds (17,237 mt).

D.5.3. Expected Domestic Annual Harvest (DAH)

The DAC is approximately 1.8 times the 1977 harvest of 20.7 million pounds (9,399 mt). The price received per pound and increased handling and sorting costs limited participation in the 1977 fishery. The DAH for the 1978 season could suffer similar limitations unless the price (ex-vessel) is increased.

With an increase in the ex-vessel price to approximately 40 cents per pound, projections for the 1978 season indicate an effort level of 110 to 120 vessels with the capability of harvesting the maximum end of the ABC harvest range of 25 million pounds (11,340 mt). The large Tanner resources in the Bering Sea will probably draw most newly made vessels to that area. However, the fishing period differences make it likely that many of these vessels will participate in the Kodiak fishery in 1978.

D.6.0. Optimum Yield

D.6.1. Departure From MSY to ABC for Biological Reasons

ABC has been set as a range with its midpoint approximately equivalent to the estimated MSY.

Specifying ABC as a range reflects the inadequacy of the biological data and allows inseason management decisions to be made based upon the current status of the stock.

D.6.2. Departure From ABC for Socio-Economic Reasons

In the absence of any explicit socio-economic objectives which would require optimum yield to deviate from the acceptable biological catch, OY is set equivalent to ABC.

D.6.3. Optimum Yield (OY)

Optimum yield for the Kodiak management area is set at 15 to 25 million pounds (6,804 to 11,340 mt).

D.7.0. Total Allowable Level of Foreign Fishery (FAC)

Given the estimated MSY and DAH, the FAC for 1977/78 is zero.

D.8.0. Management Regime

See statewide section 8.0.

South Peninsula/Aleutian Management Area

E.3.0. Description of Fishery

E.3.1. Area and Stocks Involved

The target species is *C. bairdi*. The area consists of three districts. (1) the South Peninsula district is defined as all Pacific Ocean waters of statistical area J[1] between the longitude of Cape Kumlik and the longitude of Scotch Cap light; (2) the Eastern Aleutian district encompasses all waters of statistical area J between the longitude of Scotch Cap light an 172° W. longitude, and south of 54° 36′ N. latitude; and (3) the Western Aleutian district includes all waters of statistical area J west of 172° W. longitude and south of 54°36′ N. laitude.

E.3.2. History of Exploitation

The Tanner crab fishery in the South Peninsula district began in 1967 with a catch of 5,000 pounds (2.3 mt). As in other areas of the Westward region, the early catch was incidental to the king crab harvest. The directed fishery for Tanner crab developed during closed king crab periods. During the 1973/74 season a major increase in fishing effort took place and 13.7 million pounds (6,214 mt) were landed (Table E1). Favorable market conditions, increased processing capacity, and extensive stock exploration helped establish Tanner crab fishing in the South Peninsula district.

[1]Statistical area J has as its northern boundary a line extending east from Cape Douglas, as its eastern boundary 150° W. longitude, as its western boundary 172° E. Longitude, and includes all waters of the Bering Sea east of 172° E. longitude.

Table E1 Historic commercial harvest and effort for the Tanner crab fishery in the South Peninsula district of the South Peninsula/Aleutian Management Area.

Calendar Year	Seasons	No. Vessels	Catch Pounds	Catch MT	No. Landings	No. Pot Lifts	Catch per lift Pounds	Catch per lift MT
1967	-	-	5,000	2.68	11	-	-	-
1968	-	-	131,700	59.74	184	-	-	-
1969	-	-	644,400	292.30	-	-	-	-
1970	-	32	2,096,400	950.91	308	26,975	78	0.035
1971	-	-	2,293,100	1,040.13	238	26,390	87	0.039
1972	-	-	3,645,400	1,653.53	-	-	-	-
1973	-	51	6,363,351	2,886.37	446	61,653	103	0.047
	1973/74 1/	66	13,728,670	6,227.23	631	102,107	134	0.061
	1974/75 1/	45	8,845,244	4,012.14	233	60,828	145	0.065
	1975/76 2/	69	18,128,102	8,222.95	506	111,758	162	0.073
	1976/77 3/	42	12,446,807	5,645.83	293	82,261	151	0.07
TOTAL (Seasons)		222	53,148,823	24,108.15	1,663	365,954	592	0.27
MEAN (Seasons)		56	13,287,206	6,027.04	416	89,239	148	0.07

1/ Fishing Year July 1 - June 30.
2/ Legal Season November 1 - June 1.
3/ Catch and effort preliminary: Season November 1 - May 15.

Data Source: Alaska Department of Fish and Game Annual Reports

The fishery had developed separately in the Chignik and Sand Point-Unimak Bight portions of the district. In the Chignik section prior to 1974 the catch was less tahn 0.8 million pounds (363 mt). Catches had increased to 4.3 million pounds (1,950 mt) in the 1974/75 season. The 1975/76 catch increased to 11.2 million pounds (5,080 mt) with Kodiak based vessels taking the majority of the catch. The 1976/77 season harvest from Chignik was 5.7 million pounds (2,586 mt).

Important fishing grounds in the Chignik section are Mitrofania Island, Seal Cape, Kujulik Bay and Semidi Islands.

Catches in the remaining portion of the South Peninsula district, Kupreanof Point to Scotch Cap, were highest in the 1973/74 season when 9.5 million pounds (4,309 mt) were landed. Landings for the 1974/75 season and the 1975/76 seasons were 5.2 and 6.9 million pounds (2,539 and 3,130 mt) respectively. The highly mobile Dutch Harbor based fleet takes 25–35 percent of the annual catch in the Unimak Bight portion of the district. The 1976/77 season harvest for this portion of the South Peninsula district was 6.8 million pounds (3,084 mt).

Although the harvest of Tanner crab in the South Peninsula District was expected to approach 20 million pounds (9,072 mt) during the 1976/77 season, much of the expected effort did not materialize.

Tanner crab fishing in the Eastern Aleutian district since 1968 has been minimal and sporadic, with 563,500 pounds (256 mt) in 1974 being the largest recorded catch (Table E2). This fishery could gain increased importance in the future as the king crab harvest is divided between more vessels and alternative sources of income are sought.

Table E2 Catch and landings by year of Tanner crab in the Eastern Aleutian district of the South Peninsula/Aleutian Management Area.

Calendar Year	No. Vessels	Catch Pounds	Catch MT	No. Landings
1968	-	3,000	1.36	22
1969	-	21,000	9.53	16
1970	-	0	0	0
1971	-	0	0	0
1972	-	4,000	1.81	0
1973	-	62,128	28.18	3
1974	14	563,500	255.60	15
1975	2	77,164	35.00	3
1976	8	534,295 1/	242.35	11
TOTAL (All Years)		1,264,687	573.83	
AVERAGE (All Years)		180,670	31.95	

Source: Alaska Department of Fish and Game Annual Reports (1968-1975)

1/ Projected harvest.

In the Western Aleutian district, Tanner crab have never been an important commercial species and most landings are incidential to the king crab fishery. Annual catches for the years 1973 through 1976 have not exceeded 168,000 pounds (76 mt) (Table E3).

Table E3 Commercial harvest by year of Tanner crab in the Western Aleutian district of the South Peninsula/Aleutian Management Area.

Calendar Year	No. Vessels	Catch Pounds	Catch MT
1973	-	168,000	76.20
1974	-	70,000	31.75
1975	1	3,320	1.51
1976	0	0	0
TOTAL (All Years)		241,320	109.47
AVERAGE (All Years)		80,440	36.49

Data Source: Alaska Department of Fish and Game Annual Reports.

E.3.2.1. Domestic Fishery

E.3.2.1.1. Description of User Groups

The U.S. commercial fisherman is the only user of the Tanner crab resource in the South Peninsula/Aleutian management area.

E.3.2.1.2. General Description of Fishing Effort

Historically, an average of 56 vessels have fished in the South Peninsula district Tanner crab fishery (1973–74 through 1975–76), while 42 vessels fished in the season (Table E1). Vessel effort in the Aleutian districts is minor with only eight vessels fishing in 1976 (Tables E2 and E3). Peak effort occurred in 1974 when 14 vessels fished in the Eastern Aleutian district.

E.3.2.1.3. Catch Trends

Catches in the South Peninsula district are increasing as new fishing grounds are being exploited (Table E1). Prior to 1974 the commercial harvest did not exceed 6.4 million pounds (2,903 mt). However, since the 1973–74 season, the catch has averaged 13.3 million pounds (6,033 mt). Commercial harvests in the Aleutian districts are sporadic with historical harvests never exceeding 600,000 pounds (272 mt). The average combined harvest (Tables E2 and E3) for the Aleutian districts is only 116,000 pounds (53 mt) annually.

E.3.2.1.4. Description of Vessels and Gear Employed

The South Peninsula fleet consists mainly of modern steel hulled crab vessels of varying size. With the exception of small local vessels at Chignik and Sand Point, most of the larger vessels come from Kodiak and Dutch Harbor. Average hold capacity is 50,000 pounds (22.7 mt). Average keel length (1976–77 season statistics) is 65 feet (19.8 m) with a range of 34 to 112 feet (10.4 to 34.1 m). Vessels weigh an average 68 tons (61.7 mt) with a range of 11 to 198 net tons (10.0–179.6 mt).

Average vessel size fishing the Aleutian districts is 86 feet (26.2 m) and 138.6 net tons (125.7 mt). Ranges appear in Table 4.

E.3.2.2. History of Foreign Exploitation

There has been no foreign exploitation of Tanner crab stocks in waters of the South Peninsula/Aleutian management area.

E.3.3. History of Management

E.3.3.1. Management Institutions, Policies, Jurisdictions

The South Peninsula/Aleutian management area is defined in Section E.3.1.

The Division of Commercial Fisheries within the Alaska Department of Fish and Game exercises management control of the fishery and maintains historical catch and production records at the headquarters in Juneau. In season management responsibility, preliminary development of management planning, and management related research is conducted by the regional ADF&G office in Kodiak and area offices in Sand Point and Dutch Harbor.

E.3.3.2. Domestic

E.3.3.2.1. and E.3.3.2.2. Regulatory Measures and Purpose of Measures

The regulatory structure developed in the South Peninsula/Aleutian management area is similar to that in the Kodiak area. The system has evolved as a result of a mixture of socio-economic considerations within the coastal communities in combination with biological information. Management measures, seasons, harvest levels, size limits and gear are described below and in Table E4.

TABLE E4. Historical Development Of Regulatory Measures For South Peninsula/Aleutian Management Area Tanner Crab.

YEAR	SEASON[1/]	GUIDELINE HARVEST LEVEL	AREA REGISTRATION	SIZE	GEAR
1967	None	None	None	None	Pots, ring nets, diving gear.
1968	None	None	None	None	Same, plus a 4" tunnel height
1969	1/1 - 7/31 & 10/1 - 12/31	None	None	None	"
1970	1/1 - 7/31 & 2/ 10/1 - 12/31	None	None	None	"
1970/71	Aleutians - 3/ Chignik-8/15-7/31 S. Pen. - 2/	None	None	None	"
1971/72	Aleutians - 3/ Chignik-8/15-7/31 S. Pen. 2/	None	None	None	"
1972/73	"	None	None	None	"
1973/74	Aleutian 11/1-10/15 Chignik 8/15-7/31 S. Pen 2/	None	None	None	"
1974/75	Aleutian 11/1-10/15 S. Pen. 8/15-7/31 (Chignik)	None	Non-exclusive	None	Same, except tunnel height to 5".
1975/76	"	None	Non-exclusive	None	"
1976/77	"	S.Pen-20-30 million pounds (9072-13608 MT)	Non-exclusive	5.5 inches (140 mm)	"

1/ Seasons may have been closed prematurely by emergency order.

2/ East of longitude of Cape Pankof: 8/15-7/31;
West of longitude of Cape Pankof: 9/15-7/31

3/ East of 172° West longitude: 9/15-7/31;
West of 172° West longitude: 11/1-7/31

Source: ADF&G Shellfish Regulations, Juneau.

Fishing seasons. Prior to 1969 fishing was open year-round. As increased biological information began to better define periods of high handling mortality (soft-shelled condition), mating and breeding periods, periods of egg deposition and peak molting time of males, closures were established to protect the resource during these critical periods of the life cycle. The South Peninsula district now has a November 1 to May 15 season and the Aleutian districts have a November 1 to June 15 season reflecting these biological parameters (table E4).

Guideline harvest levels. No guideline harvest levels were established prior to the 1976–77 season in the South Peninsula district and Aleutian districts. The Tanner crab fishery was slow to develop (see section 3.2) and the catches were well below the potential of either district. During the 1976–77 season, the Alaska Board of Fisheries adopted a 20–30 million pound (9,072–13,608 mt) harvest range for the South Peninsula district. Exploitation rates have not necessitated harvest guidelines in the Aleutian districts. See section 3.3.2.2. for the purpose and rationale of guideline harvest levels.

Size limits. Research results of growth per molt studies and size at maturity provided the basis for the 5.5 inch (140 mm) minimum size limit for male Tanner crab, imposed for the first time during the 1976–77 season. See section 3.3.2.2. for the purpose of this size limit.

Gear. Pots, ring nets, and diving gear have constituted legal gear for commercial harvesting of Tanner crab since the fishery's beginning in 1967. In 1968 a tunnel entrance of not more than 4 inches (102 mm) was set. In 1974 this was changed to not exceed 5 inches (127 mm). These tunnel restrictions allow Tanner crab free access to a pot while keeping out most larger king crab, thus reducing sorting and handling mortality.

Sex limitation. See section 3.3.2.2. for purpose and rational of a male only tanner crab fishery.

E.3.3.3. Foreign

There is no foreign fishery in this management area.

E.3.3.4. Effectiveness of Management Measures

The recent implementation of management measures has not allowed sufficient time for them to be evaluated as to their long term effectiveness. It appears that Tanner crab stocks in the management area have not been over exploited and current regulations will adequately protect breeding stock and maintain the general stock health.

E.3.4. History of Research

Refer to section 3.4. of statewide plan.

E.3.5. Social Economic Characteristics

E.3.5.1. Output of Subject Domestic Commercial Fishery

E.3.5.1.1. Value of Catch (ex-Vessel)

Ex-vessel revenue generated in the 1976–77 Tanner crab fishery for the South Peninsula/Aleutian management area based on an anticipated harvest of 12.4 million pounds (5,646 mt) and average price per pound of 32 cents is $3.97 million. See table 1 for catch and ex-vessel value since 1969.

E.3.5.1.2 Description and Value of Product (Wholesale)

See section 3.5.1.2 and tables 2 and 3.

E.3.5.1.3. Market, Domestic and Foreign

See section 3.5.1.3.

E.3.5.2. Domestic Commerical Harvesting Charactristics

See section E.3.2.1.4. and table 4 for the description of fleet.

E.3.5.2.1. Total Gross Income of Fleet

The gross income of the South Peninsula/Aleutian Tanner crab fleet for all fisheries was $13.1 million in 1976. This compares to a Tanner crab harvest of $3.6 million. The average total gross income per vessel was $156,000. Table 5 compares all management areas for 1976.

E.3.5.2.2. Investment in Vessels and Gear

This information is not available. See section 3.5.2.2.

E.3.5.2.3. Annual Participation in Subject Fishery

In the South Peninsula district 505 landings were made during the 1975–76 season and 525 in the 1976–77 season. Based on an estimated 5 days per trip, 2,523 and 2,625 vessel-days were expended respectively. Only 11 landings were made in 1976 in the Aleutian districts, 55 vessel-days at 5 days per trip.

E.3.5.2.4. Total Manpower Employed

During the 1976–77 season 150 fishermen were employed in the harvesting sector in the South Peninsula district based on 3.5 men per vessel. In the Aleutian districts the larger vessels, averaging 4 men per vessel, employed 36 fishermen.

E.3.5.2.5. Economic Viability

See statewide section 3.5.2.5. For vessels participating within this management area, no data are available relative to the economic returns.

E.3.5.3. Domestic Commercial Processing Characteristics

E.3.5.3.1. Total Gross Income of Area Processors

See statewide section 3.5.3.1.

E.3.5.3.2. Investment in Plants, Etc.

There are no data available on the capitalization of the processing sector in this management area. See statewide section 3.5.3.2.

E.3.5.3.3. Total Employment and Labor Income

Total employment at peak production (all plants) is estimated at 225 for the South Peninsula district and 1,120 in the Aleutian districts. See statewide sections 3.5.3.3.

E.3.5.3.4. Economic Viability

See statewide section 3.5.3.4.

E.3.5.4. Recreation Fishery Characteristic

No recreational fishery exists for Tanner crab in the South Peninsula and Aleutian districts.

E.3.5.5. Subsistence Fishing Characteristics

A subsistence fishery exists for personal use and the level of catch is insignificant compared to commerical harvest. The fishery is open year round with no sex, size, or gear restrictions. Subsistence crab may not be sold or bartered. Subsistence fishermen must inscribe their name and address on their buoys.

E.3.5.6. Indian Treaty Fishing Characteristics

No Indian treaty rights exists.

E.3.5.8. Area Community Characteristics

E.3.5.8.1. Total Population

A 1976 population estimate for the communities within this management area was 8,300. Population trends from 1960 are in table 7.

E.3.5.8.2. Total Employment

See statewide section 3.5.8.2. and table 8.

E.3.6 Interaction Among User Groups

Since there are only U.S. fishermen using the Tanner crab resource in this management area, there are no allocation conflicts.

E.3.7. Federal and State Revenue Derived From Fishery

State revenue derived from the Tanner crab fishery is documented in the general statewide summary of this report, section 3.7 and table 9.

E.4.0. Biological Descriptor

E.4.1. Life History Features

See statewide section 4.1 for description of biological history.

E.4.2. Stock Units

Stock units are not defined for the South Peninsula/Aleutian management area.

E.4.3. Catch Effort Data

Catch and effort data are shown in table E1 for the South Peninsula district and in tables E2 and E3 for the Aleutian districts (Unalaska and Adak-Western Aleutians portions).

E.4.4. Survey and Sampling Data

Tanner crab survey information is collected during the annual king crab population indexing and tagging study cruises in the South Peninsula (Sand Point-Unimak Bight portion only) and Aleutian districts (Unalaska portion). Biological sampling and effort data is collected via dockside sampling.

E.4.6. Quality of Data

See section 4.6.

E.4.7. Current Status of Stocks.

E.4.7.1. Maximum Sustainable Yield (MSY)

Sufficient data to estimate MSY using accepted population models are not available for the South Peninsula Tanner crab stock. During the last four seasons, catch has ranged from 8.8 million pounds (4,012 mt) to 18.1 million pounds (8,210 mt) with a mean of 13.05 million pounds (5,919 mt). This fishery is new and not yet fully developed. To encourage exploration, but at the same time provide industry with some guidance as to the sustainable level of harvest they may be able to expect from this area, the Board of Fisheries has set a guideline harvest range of 20 to 30 million pounds (9,072 to 13,608 mt) for the 1977–78 season. Therefore, a weak estimate of an MSY of 20 million pounds (9,072 mt) is made for the South Peninsula district. This estimate is 2 million pounds (907 mt) greater than the historic peak harvest and at the lower boundary of the guideline harvest range.

For the Aleutian districts there are little data, either biological or in terms of catch,

to make even a weak estimate of the potential long run maximum average yield.

Prior to the 1976-77 season the peak harvest in the Eastern district occurred in 1974 when 563,500 pounds (256 mt) were landed and in the Western district in 1973 when 168,000 pounds (76 mt) were taken, a total of 731,500 pounds (332 mt). the 1976-77 preliminary catch data shows that 1.5 million pounds (680 mt) has been landed and it is projected that at least 2 million pounds (907 mt) will be caught by the close of the season. There are no data which indicate that this rate of harvest cannot be sustained and, therefore, a weak estimate of an MSY of 2 million pounds (907 mt) is made for the Aleutian districts (the Alaska Board of Fisheries has not set a guideline harvest level for the Aleutians).

E.4.7.2. Equilibrium Yield (EY)

Data relative to stock dynamics and total population are unavailable to estimate what potential harvest could be sustained and still maintain the stock at its current level of abundance.

E.4.7.3. Acceptable Biological Catch (ABC)

The ABC for the South Peninsula district is set at 20 to 30 million pounds (9,072 to 13,608 mt). This range encompasses the weak estimate of MSY and allows for expansion of the fishery since it is not yet considered to be fully developed. For the Aleutian districts ABC is set equivalent to the MSY of 2 million pounds (907 mt).

E.4.8 Estimated of Future Stock Condition

Recent catch trends and the abundance estimates from both the commercial fishery and research information indicate a healthy fishery.

E.5.0. Catch and Capacity Descriptors

E.5.1. Data and Capacity Descriptors

E.5.1.1. Domestic

Harvesting and processing capacities are listed in tables 6 and 11. The number of vessels is calculated from fish ticket information. Descriptors relating to crew, vessel, and gear capacities were collected through vessel interviews for ADF&G records. Processing information was gathered from ADF&G annual reports and interviews with plant managers.

E.5.1.2. Foreign

There is no foreign fishery in the South Peninsula/Aleutian management area.

E.5.2. Domestic Annual Capacity (DAC)

With 42 vessels in the 1976-77 fishery having a total tank capacity per trip of 2,106,000 pounds (955 mt), and making 3.5 trips per month for the 6-month season, the South Peninsula district DAC is 44,226,000 pounds (20,061 mt). In the Aleutian districts, (1976-77 season) nine vessels, with a total tank capacity of 1,530,000 pounds (694 mt) making three trips per month (heavy weather factors) during a 6-month season would have a DAC of 27,540,000 pounds (12,492 mt).

E.5.3. Expected Domestic Annual Harvest (DAH)

The 1976-77 seasonal guideline harvest range for the South Peninsula district was approximately three times the catch of 6.7 million pounds (3,040 mt). Ex-vessel price, weather, handling, and sorting due to minimum size limit and successful salmon and king crab seasons may have blunted interest in the fishery. An increase in the ex-vessel price should increase interest for the 1977-78 season with expected effort approximating the 1975-76 level of 69 vessels. Therefore, the DAH for the South Peninsula District is 20-30 million pounds (9,072 to 13,608 mt). The DAH for the 1977-78 season in the Aleutian districts is estimated at 2 million pounds (907 mt).

E.6.0. Optimum Yield (OY)

E.6.1. Departure From MSY to ABC for Biological Reason

The ABC of 22 to 32 million pounds (9,979 to 14,515 mt) encompasses the MSY estimate for the South Peninsula/Aleutian management area. See section 3.4.7.3.

E.6.2. Departure From ABC for Socioeconomic Reasons

Since socioeconomic objectives have not been specified which would require formulization of the OY to deviate from the acceptable biological catch, the OY is set equivalent to the ABC.

E.6.3. Optimum Yield (OY)

In the absence of other data, the OY is set equivalent the ABC of 22 to 32 million pounds (9,980 to 14,515 mt).

E.7.0. Total Allowable Level of Foreign Fishery (FAC)

Given the estimated MSY and DAH, the FAC for 1977-78 is zero.

E.8.0. Management Regime

See statewide section 8.0.

Bering Sea Management Area

F.3.0. Description of Fishery

F.3.1. Species and Location

The Bering Sea management area is defined as all Bering Sea waters north of 54° 36' N. latitude.

The target species is *C. bairdi*. *C. opilio* is subordinate and currently comprises about 25 percent of the total catch (approximately 3 percent and 60 percent of the domestic and foreign harvests respectively).

F.3.2. History of Exploitation

F.3.2.1. Domestic Fishery

U.S.fishermen entered the Bering Sea in 1947 to harvest red king crab (*Paralithodes camtschatica*). The first reported catches of Tanner crab were made in 1968 and were incidental to the king crab harvest. In 1974, a directed Tanner crab fishery was started with the target species being *C. bairdi*. The period of full scale fishing covers just 3 years in the Bering Sea, but over 34.5 million pounds (15,028 mt) had been landed prior to 1977. The geographic areas fished by the U.S. fishermen during 1976 were predominately International North Pacific Fisheries Commission (INPFC) areas[1] 5564 and 5569 located north and northwest of Unimak Island and INPFC areas 5669 and 5670 near St. George Island.

F.3.2.1.1. Description of User Groups

Seattle-based fishermen, non-resident to the State of Alaska, are the primary user groups of the Tanner crab resource in the Bering Sea. Some Alaskan residents who own larger vessels fish the Bering Sea after first fishing their local area.

F.3.2.1.2. General Description of Fishing Effort

The fishing effort in the Bering Sea is continuing to increase annually in number of vessels and vessel size. In 1973, Tanner crab catches were incidental to king crab. In 1977, a large scale effort is presently underway by both fishermen and processors to harvest the allowable biological catch. During the summer of 1977 there were over 60 large vessels and 15 processors in the Dutch Harbor area capable of processing 750,000 pounds (327 mt) of Tanner crab per day.

F.3.2.1.3. Catch Trends

U.S. fishermen caught 18,000 pounds (8.2 mt) of Tanner crab in 1968 and 22.3 million pounds (10,115 mt) in 1976. Preliminary 1977 figures indicate a catch of $51.5 million pounds (23,400 mt). Annual harvests are shown in Table 1.

F.3.2.1.4. Description of Vessels and Gear

Boats fishing Tanner crab in 1976 were generally steel king crab vessels that averaged 140 net tons (127 mt) and 93.4 feet (28.47 m) in keel length (Table 4 and Table 6).

Gear fished during the 1976/77 season was an estimated 200-300 modified king crab pots per vessel.

F.3.2.2. Foreign Fishery

A foreign fishery in the Bering Sea for king crab started in 1930. Tanner crab harvested prior to 1964 were caught incidentally in this fishery. However, in 1964, when the foreign king crab fishery was at its peak, U.S. bilateral agreements resulted in immediate reductions in foreign production of king crab, emphasis then shifted to Tanner crab. Since 1970, quotas for Tanner crab have sharply reduced foreign landings

F.3.2.2.1. User Groups

The Japanese initiated the Bering Sea king crab fishery in 1930 with the U.S.S.R. entering in 1959. Both nations shifted to Tanner crab in the middle to late 1960's. There has been no Soviet crab fishing since 1971.

F.3.2.2.2. and F.3.2.2.3. General Description of Fishing Effort and Harvest

Foreign catches of Tanner crab are shown in Table F1. The combined Japanese-Soviet catch increased rapidly from 1.7 million crab in 1965 to 24 million crab in 1969 and 1970. Since 1970, quotas have reduced the foreign landings. (Table F2.) Japanese quota allocations are divided between a factoryship fleet and a landbased fleet by Japanese domestic regulation.

[1]INPFC areas are 1° longitude by 1° latitude rectangles coded by the latitude, longitude coordinate of the southeast corner of each area. For example, area 5564 is that region between 55° and 56° N. latitude and 164° and 165° W. longitude.

Table F1. Catches of Tanner crab, C. bairdi and C. opilio, in the eastern Bering Sea, 1965/76 (millions of crabs).

YEAR	JAPAN (Tangle nets)	JAPAN (Pots)	U.S.S.R. (Tangle nets)	UNITED STATES (Pots)	TOTAL
1965	1.030	-	0.665[a]	-	1.695
1966	1.490	-	0.665[a]	-	2.155
1967	8.320	0.290	3.390[a]	-	12.000
1968	10.100	1.000	3.490[a]	0.006	15.476
1696	9.736	7.855	6.243	0.353	24.187
1970	7.679	10.511	5.724	0.482	24.396
1971	0.851	14.000	4.204	0.061	20.004
1972	0.386	15.207	-	0.043	15.635
1973[b]	-	13.943	-	0.133	14.076
1974[c]	-	13.986	-	2.531	16.518
1975[d]	-	9.228	-	2.760	11.988
1976	-	9.228	-	8.931	18.159

[a] Estimated by applying number of crabs per case in 1969 to case pack figures in indicated year.
[b] Japanese catch in 1973 was 5.992 million crabs in Area A and 7.951 million crabs in Area B.
[c] Japanese catch in 1974 was 5.999 million crabs in Area A and 7.987 million crabs in Area B.
[d] Japanese catch in 1975 and 1976 was about 2.401 million crabs in Area A' and 6.827 million crabs in Area B'.

SOURCES: Statistics for the Japanese and United States fisheries are from INPFC Documents. Statistics for the U.S.S.R. fishery provided to the United States by the U.S.S.R.

TABLE F2. TANNER CRAB QUOTAS ESTABLISHED UNDER BILATERAL AGREEMENTS WITH JAPAN AND THE U.S.S.R.

YEARS	JAPAN	U.S.S.R.
	(NUMBER)	(CASES)[1/]
1965-66		
1967-68		
1969-70	16,000,000[2/]	40,000
1971-72	15,000,000[3/]	35,000
	(NUMBER)	(NUMBER)
1973-74 (Area A)	6,000,000	1,800,000
1973-74 (Area B)	8,000,000	2,400,000
	(METRIC TONS)	(METRIC TONS)
1975-76 (Area A)	2,500	750
1975-76 (Area B)	7,700	2,310

1/ One case is equal to 48 ½-pound cans. In producing frozen meat Japan considers 29.3 pounds of crab meat equivalent to one case.

2/ Plus an allowance of 15 percent

3/ Plus an allowance of 10 percent

Available historical information on Tanner crab catches by the Japanese land-based fleet in the central Bering Sea is scanty. The fishery existed in the early 1970's when annual catches were reported to be 4,630,000 pounds (2,100 mt). In 1975 and 1976, the Japanese agreed to submit daily positions and catches to U.S. officials for all vessels fishing west of 175° W. longitude, north of 58° N. latitude and east of the U.S.-U.S.S.R. Convention Line of 1867. Highlights of these 2 years of data are presented below.

Statistic	1975	1976
Vessels licensed by Japan Fishery Agency.	28	31
Vessels fishing	28	31
First day of fishing	May 5	May 5
Last day of fishing	Oct. 21	Oct. 18
Total vessel days	1,155	1,477
Total catch (number of crab).	2,918,852	2,826,707
Average catch per vessel day.	2,527	1,913

Harvests by the Japanese in 1977 are restricted to a quota of 27,550,000 pounds (12,500 mt). Based on the catch composition in 1975 and 1976, 11,200,000 pounds (5,110 mt) would be expected to be *C. bairdi* and 16,300,000 pounds (7,400 mt) *C. opilio*. The *C. bairdi* catch will be primarily from the factoryship fleet while it is assumed that all crab taken by the land-based fleet will be *C. opilio*. Under conditions of the preliminary fishery management plan for eastern Bering Sea crab, the Japanese are permitted to harvest 9,700,000 pounds (4,400 mt) of their total quota of Tanner crab from the area west of 173° W. longitude and north of 58° N. latitude. Under Japanese domestic regulations the land-based vessels were allotted 4,900,000 pounds (2,222 mt) west of 175° W. longitude and the factoryships were allotted 3,688,300 pounds (1,673 mt) east of 175° W. longitude and west of 175° W. longitude and north of 58° N. latitude.

F.3.2.2.4. Vessels and Gear

There has been no Soviet crab fishery in the eastern Bering Sea since 1971. The two factoryships utilized by Japan to process crab in recent years are the *Keiko Maru* (6,821 mt) and the *Koyo Maru* (6,804 mt). Since 1975, each factoryship has been supplied by six catcher boats each about 100 gross ton (91 mt). Japanese crab fishermen now deploy conical, "top-loading" pots which are fished on a groundline. About 130 pots are fished per line, generally with a 3–4 day soak. Each vessel has about 2,000 pots distributed among 15–18 strings of this gear. The gear is hauled using a longline puller, and crabs are removed, stored dry in sacks in the fish hold, and delivered daily to the factoryship where processing takes place.

The gear used by the land-based vessels is identical to that of the catcher boats delivering to Japanese factoryships, i.e., about 125 individual conical pots fished on a longline. Vessels vary in size from 230 to 250 gross tons (209 to 454 mt) with a crew of 25. The catch is processed on each land-based vessel, usually by butchering, cooking and freezing in sections. The finished product is returned to Japan either by the land-based vessel or by a transport ship. The number of vessels licensed by the Japanese to participate in this fishery has been reduced from 31 in 1976 to 11 in 1977.

F.3.3. History of Management

F.3.3.1. Management Institutions

The Bering Sea Tanner crab stocks have been managed by two agencies. The Alaska Department of Fish and Game manages the domestic fishery with the Alaska Board of Fisheries determining the regulations. The National Marine Fisheries Service has managed the foreign fishing and provided the majority of the research data applicable to both domestic and foreign fleets.

F.3.3.2. Domestic Management

F.3.3.2.1. Regulatory Measures

Regulations governing the Bering Sea Tanner crab fishery in order of implementation were: (1) males-only, (2) gear, (3) season, (4) size limit, and (5) harvest levels by area. The last three measures were promulgated during 1976 by the Alaska Board of Fisheries. Table F3 shows the historical development of the domestic regulations.

TABLE F3. Historical Development Of Domestic Regulatory Measures For Bering Sea Management Area Tanner Crab

YEAR	SEASON[1/]	GUIDELINE HARVEST LEVEL	AREA REGISTRATION	SIZE	GEAR
1973/74	None	None	None	None	Pots, ring nets, diving gear and tunnel to 4 inches.
1974/75	7/1 - 6/15[2/]	None	Non-exclusive	None	Same except tunnel to 5 inches.
1975/76	7/1 - 6/15	None	Non-exclusive	None	" "
1976/77	7/1 - 6/15	None	Non-exclusive	5.5 in. (140 mm)	" "

1/ Seasons may have been closed prematurely by emergency order.

2/ Season opened by emergency order sometime after 7/1.

Source: ADF&G Shellfish Regulations, Juneau.

F.3.3.2.2. Purpose of Measures

The males-only season concepts discussed in section 3.3.2.2. of the statewide regulations apply to the Bering Sea. Harvest levels and size limits were promulgated by the Board of Fisheries believing that these restrictions would prevent over-exploitation until more scientific knowledge was gathered. It has been the Board's policy that a conservative approach is necessary when the data base to manage a fishery is inadequate (see Sections 3.3.2. and 4.0.).

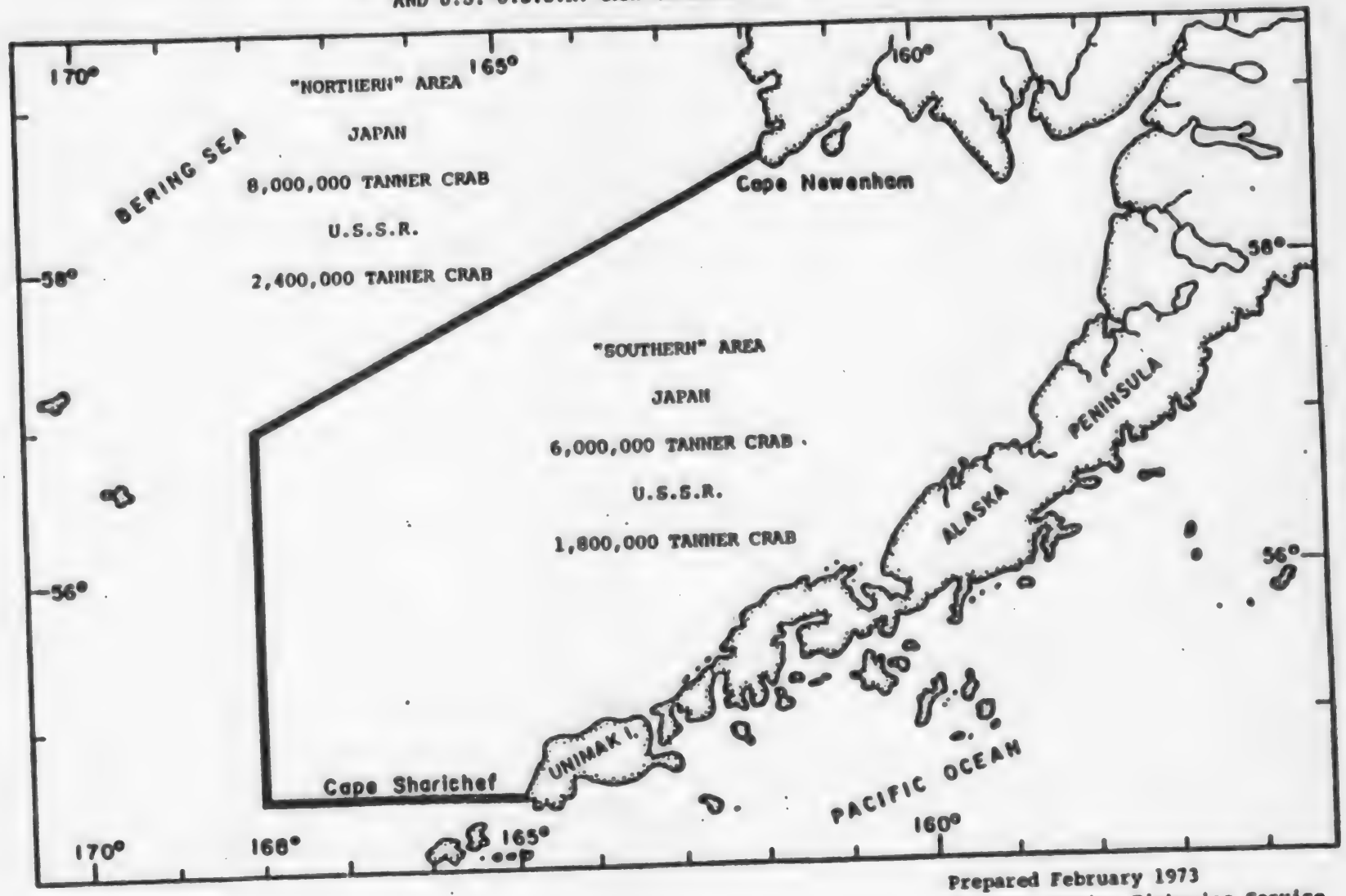
F.3.3.3. Foreign Management

F.3.3.3.1. Regulatory Measures

Prior to 1964 there were no U.S. regulations for the foreign crab fisheries of the eastern Bering Sea. In 1964, the United States ratified the 1958 Continental Shelf Convention and declared king and Tanner crab (among other species) as "Creatures of the Continental Shelf".

Catch quotas were first applied to the foreign Tanner crab fisheries in 1969 (only male crab could be retained), and use of tangle net gear was restricted in later bilaterals. These bilateral agreements have been modified every 2 years, resulting in progressively lower foreign quotas (Table F2.). Since 1973, separate Tanner crab quotas have applied to each of two subareas of the Bering Sea. (Figures F1 and F2). The sub-areas were further defined in the 1975–76 bilateral to eliminate the foreign fishery east of 164° W. longitude and south of 55° 30′ N. latitude—the principal area fished by the United States at that time. For the 1977 season the regulations are given in the Tanner crab PMP, January 1977. The foreign quota was increased to 27,550,000 pounds (12,500 mt) with the increase to come primarily from areas of *C. opilio* concentration. Foreign fishing was restricted to the area north of 56° N. latitude and west of 164° 00′ W. longitude to further separate the U.S. and Japanese fleets.

Figure F1. EASTERN BERING SEA CRAB QUOTAS FOR 1973 AND 1974
ESTABLISHED BY U.S.-JAPAN CRAB AGREEMENT DECEMBER 1972
AND U.S.-U.S.S.R. CRAB AGREEMENT FEBRUARY 1973



Prepared February 1973
National Marine Fisheries Service
Juneau, Alaska

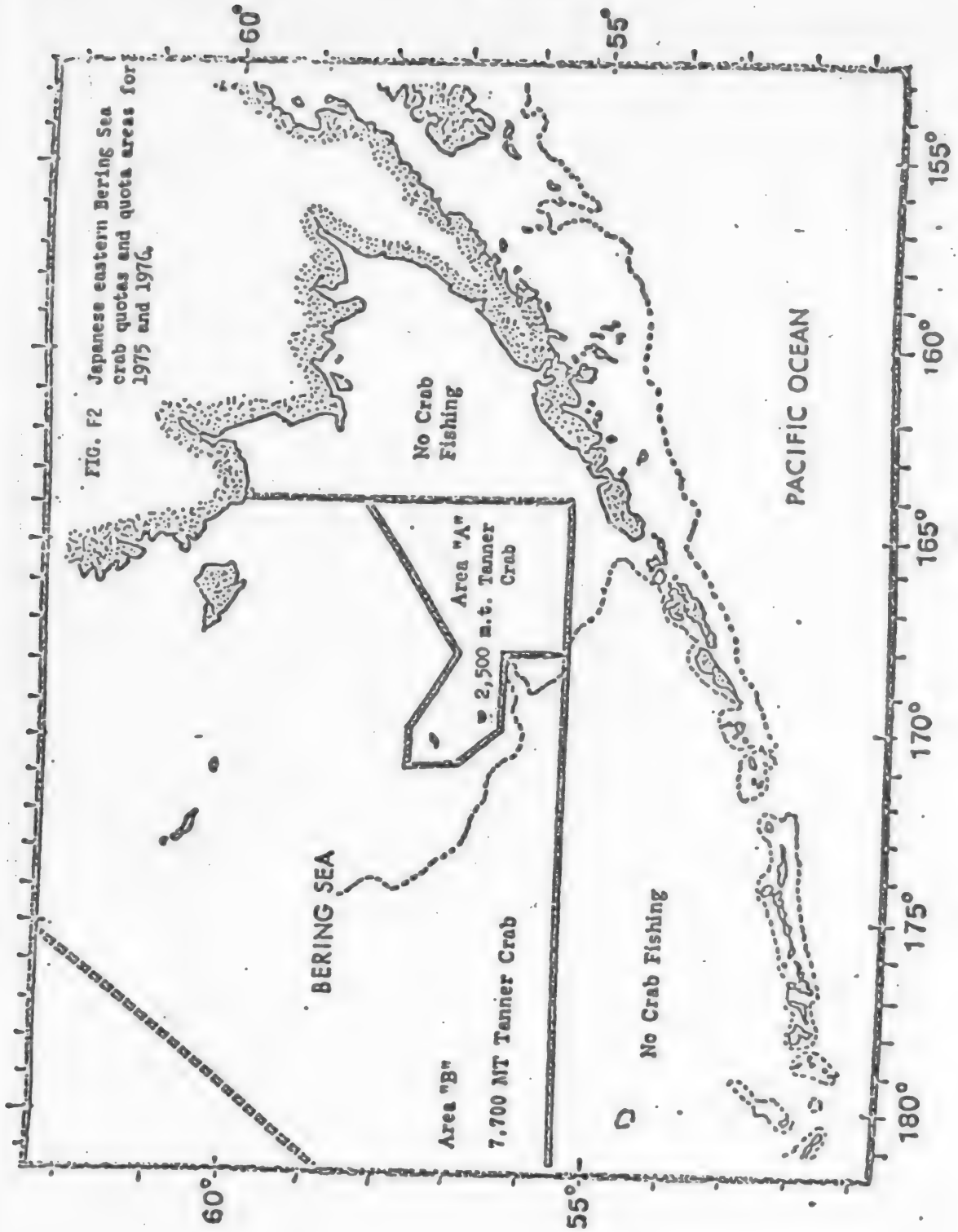


FIG. F2 Japanese eastern Bering Sea crab quotas and quota areas for 1975 and 1976.

The United States initiated an observer program in 1971 aboard the two Japanese crab factoryships to make biological observations and to ascertain Japanese compliance to quota restrictions established in the bilateral agreement. Although observers spent a total of 191 vessel-days at sea during the 1971–73 period, it was not possible to determine Japanese adherence to catch quotas because of a lack of authority to control the unloading operations of the catcher boats and the processing operation.

The observer program was strengthened during bilateral negotiations, and in 1975 and 1976 the U.S. observers positively verified Japanese crab catch statistics.

A pair of U.S. observers are monitoring catches of both Japanese factoryships, the *Keiko Maru* and *Koyo Maru*, throughout the entire 1977 fishery. It is expected they will harvest their allotment of 21,500,000 pounds (9,752 mt). A team of six U.S. observers will also be associated with the land-based fleet during the fishing season which is scheduled to begin in late May. The other observers will travel on a Japanese enforcement vessel patrolling the land-based fleet; they will board vessels at random to document fishing operations and catches.

F.3.3.3.2. Purpose of Measures

Restrictions on legal gear to pots only was established to eliminate non-selective gear that contributed to mortality of females and sublegal size crab. The male only requirement protects the female breeding stock. The quotas reduce the foreign exploitation on *C. bairdi*, the species of Tanner crab preferred by the U.S. industry. The closed areas eliminate foreign fishing in the principal areas fished by the United States.

F.3.3.4. Effectiveness of Management Measures

The general effect of the sex, season and gear limitations are described in Section 3.3.4. of the statewide plan. It is premature to determine the effect that the domestic size limit and harvest levels will have on Bering Sea Tanner stocks. The quotas applied to the foreign fishery have been successful in aiding the development of a larger domestic fishery. Area fishing restrictions have minimized gear conflicts and competition for concentrations of large crab.

F.3.4. History of Research

See statewide Section 3.4.

F.3.5. Socio-economic Characteristics

F.3.5.1. Output of Domestic Commercial Fishing

F.3.5.1.1. Value of Catch (Ex-vessel)

The estimated revenue for Tanner crab caught in the Bering Sea in 1976 was $4.4 million.

F.3.5.1.2. and F.3.5.1.3. Value of Product and Markets

Refer to corresponding sections in statewide section.

F.3.5.2. Domestic Commercial Harvesting Characteristics

Data for the Bering Sea area is not available. Refer to corresponding section in statewide section.

F.3.5.2.1. Total Gross Income of Fleet (from subject fishing and all other fisheries)

The gross income of the Bering Sea domestic Tanner crab fleet for all fisheries (salmon, halibut, king crab, etc.) was $30.4 million in 1976. This compares to a Tanner crab harvest valued at only $4.4 million. The averge total gross income per vessel was $460,044. Table 5 compares all management areas for 1976.

F.3.5.3. Domestic Commercial Processing Characteristics

The majority of Tanner crab caught in the Bering Sea are processed at Dutch Harbor by shore-based plants and floating processing vessels. Some crab is processed on the grounds by catcher-processor vessels and some is transported to processing plants located on the Alaska Peninsula at Sand Point and Chignik. Still other loads are transported to Kodiak and processed. In 1977, 15 processors are handling Tanner crab with a peak daily production of approximately 750,000 pounds (340 mt).

F.3.5.4. Recreational Fishing Characteristics

No recreational fishery exists.

F.3.5.5. Subsistence Fishing Characteristics

No data on subsistence fishing is available for the Bering Sea, but effort is minimal.

F.3.5.6. Indian Treaty Fishing Characteristics

No Indian treaty fishing exists in the Bering Sea.

F.3.5.7. Area Community Characteristics

Refer to statewide Section 3.5.7.

F.3.6. Interaction Among User Groups

This section discussed in statewide Section 3.6.

F.4.0. Biological Descriptors

F.4.1. Life History Features

This section is discussed in statewide Section 4.1.

F.4.2. Stock Units

In the Bering Sea, two species of Tanner crab are harvested with *C. bairdi* being the target species because of its larger size. *C. opilio* is presently undesirable to U.S. processors due to its smaller size, but is harvested by the Japanese and according to NMFS trawl surveys is the most numerous of the two species. The distribution of *C. bairdi* extends from Bristol Bay northward to the Pribilof Islands. Stocks of *C. opilio* have a wider distribution than *C. bairdi* with their center of abundance more to the northwest than that of *C. bairdi*. Discrete stocks of *C. bairdi* have not been documented. However, there appears to be a density separation of *C. bairdi* populations at 168° W. longitude, with concentrations occurring around the Pribilof Islands and east of 168° W. longitude along the Alaska Peninsula.

F.4.3. Catch and Effort Data

The commercial catch is sampled at dockside in Dutch Harbor and skippers are interviewed to determine area fished, number of pots pulled, average weight of crab landed and other relative data. A sample of crab is measured to determine width frequency. Table F1 lists catch data (foreign and domestic) for the Bering Sea.

F.4.4. Survey and Sampling Data

The Bering Sea is surveyed on a yearly basis by the National Marine Fisheries Service. A description of the operating procedures and sampling techniques can be found in "Northwest Fisheries Center Report to Industry 1976". These trawl surveys are used to determine abundance by size, distribution, and other population characteristics.

F.4.5. Other

See statewide section.

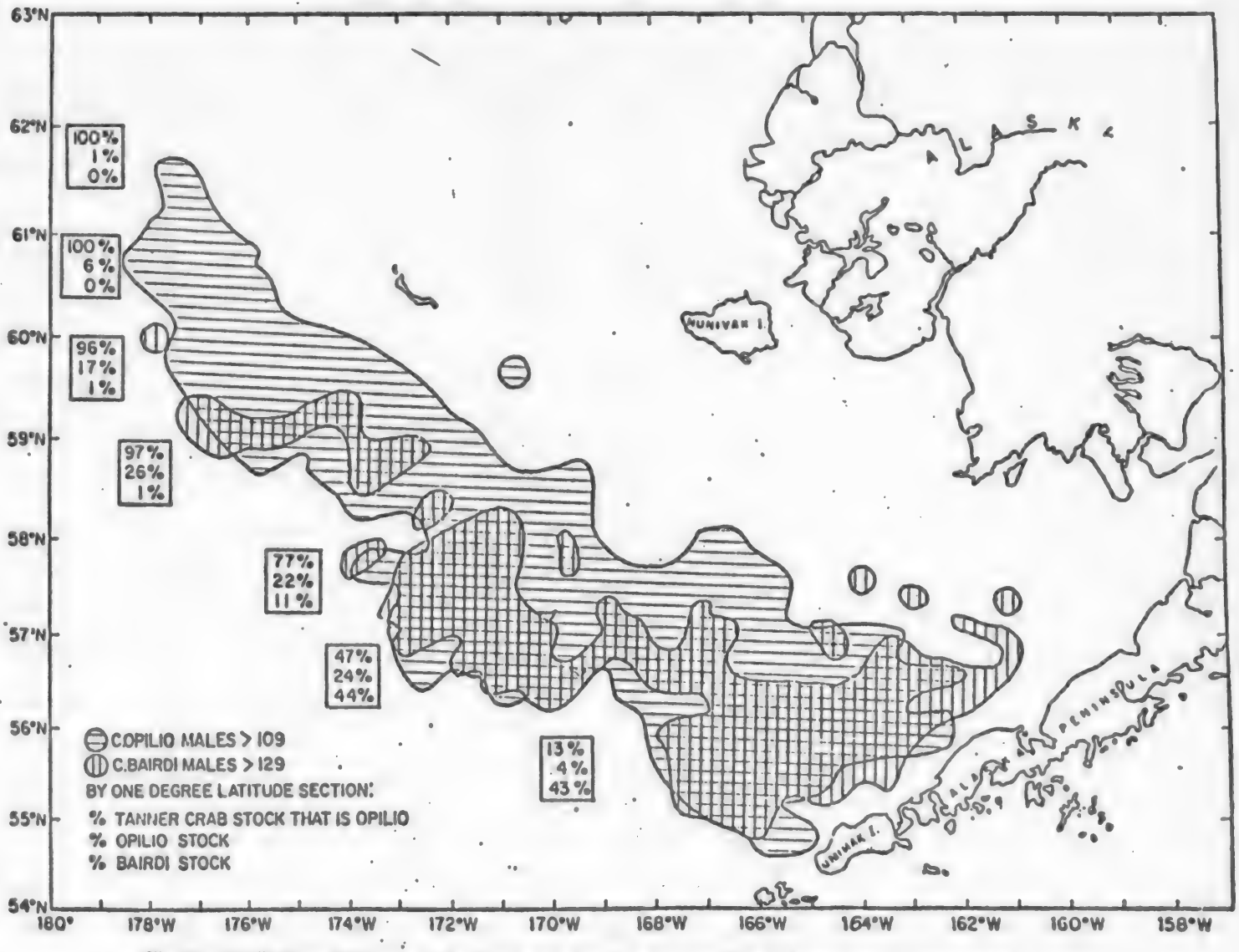


Fig. F3. Distribution of Tanner crab stocks and species composition of larger male Tanner crabs by Latitude

TABLE F4. Annual Abundance Estimates (millions of crabs) for Tanner crabs from NOAA R/V OREGON Surveys in the Eastern Bering Sea.

SEX	Size Group*	1973	1974	1975	1976	1977
C. bairdi						
Males	<85	62.8	200.7	116.3	136.8	192.7
	85-129	140.5	255.0	207.5	131.7	159.6
	>129	66.9	130.5	209.6	157.8	111.1
Total males		270.2	586.2	533.4	426.3	463.4
Females	<85	47.9	210.5	120.8	174.7	328.4
	>84	90.3	175.7	102.2	220.4	215.8
Total females		138.2	386.2	223.0	395.1	544.2
Total population		408.4	972.4	756.4	821.4	1007.6
C. opilio						
Males	<110	115.2	1,480.3	1,916.7	2,221.1	**
	>109	84.7	246.7	274.8	181.6	
Total males		199.9	1,727.0	2,191.5	2,402.7	
Females	<65	26.4	1,415.3	3,213.1	4,867.1	
	>64	26.8	195.9	194.3	697.3	
Total females		53.2	1,611.4	3,407.4	5,564.4	
Total population		253.1	3,338.4	5,598.9	7,967.1	
C. hybrid						
Males	<110			47.4	27.8	
	>109			33.8	16.5	
Total males				81.3	44.3	
Females	<65			190.8	1.1	
	>64			28.9	13.9	
Total females				219.7	15.0	
Total population				301.0	59.3	

* mm, carapace width. ** 1977 survey results for C. opilio were not available at time of publication.

F.4.6. QUALITY OF DATA

Refer to statewide discussion in Section 4.6.

F.4.7. CURRENT STATUS OF STOCKS

Table F3 presents estimates of abundance for Tanner crab based on NMFS Surveys which extended to approximately 58° N. latitude in recent years. (OCS-related survey results of the eastern Bering Sea north to 62° N. latitude in 1975 (figure F3) indicate that these NMFS surveys provide adequate coverage for the *C. bairdi* population.) The 1977 survey results are in line with previous stock estimates, corroborating the estimate of a long range downward trend in recruitment postulated by Somerton & Low (1977). Current stock conditions are relatively high but much reduced levels of harvestable males are forecast by 1980 and continuing for several years thereafter.

TABLE F5.—*Estimates of maximum sustainable yield of male snow (Tanner) crab in the Eastern Bering Sea*

Species	Size group	Millions of crabs	Average weight (pounds)	Million of pounds	Exploitation rate	MSY (millions of pounds)
C. bairdi	*≥135	92	2.41	222	0.40	89
C. opilio	>115	431	1.79	772	.58	**440

*The biological data are based on inside the spine measurements. The legal definition includes the spines in carapace measurements. Therefore, the legal interpretation of the size limit will allow the harvest of crab which are according to the biological measurements up to 5mm smaller. Therefore, when calculating an MSY based on 140mm minimum legal size, all crab ≥135mm must be considered.

**225 million pounds available north of 58° N. latitude.

Source: NMFS-Juneau, Alaska.

Survey coverage for *C. opilio* has expanded during the 1973-75 period accounting for at least some of the increase in apparent abundance. However, it is obvious from the OCS survey results that the NMFS standard survey still does not encompass the entire range of the species. The problem of incomplete survey coverage also applies to estimates of abundance for *C. bairdi* × *C. opilio* hybrids, given in Table F4.

F.4.7.1. Maximum Sustainable Yield (MSY)

MSY Values for *C. bairdi* Tanner crabs have been estimated by multiplying stock abundances by conservative exploitation rates derived from the yield per recruit analyses of Somerton & Low (1977).

Estimates of abundance of Tanner crab are available for both species, *C. bairdi* and *C. opilio*, in the eastern Bering Sea. However, the distribution of abundance is different between species (Figure F3). Almost all stock of *C. bairdi* occurs south of 58° N. latitude. *C. opilio* extends farther north, with half of the total stock surveyed during the 1975 OCS-related work north of 58° N. latitude.

Estimates of MSY for *C. bairdi* and *C. opilio* are given in Table F5. For *C. bairdi*, the 1977 NMFS survey abundance estimates are used, since coverage of this species is adequate.

The estimated abundance of legal sized (greater than 140 mm) male crab is 222 million pounds (100,725 mt). An average annual exploitation rate of 0.40 applied to the estimated abundance of legal-sized *C. bairdi* males gives an MSY of 89 million pounds (40,381 mt).

The estimated MSY for *C. opilio* is calculated from the estimated abundance of males greater than 115 mm (772 million pounds—350,000 mt), determined from the 1975 OCS survey. This component of the population is used since no size limit exists for this species and 115 mm is the smallest size significantly present in the current fishery for *C. opilio*.

The calculated exploitation race applied is 0.58 (Sumerton and Low, 1977) and results in an MSY of 448 million pounds (203,000 mt) for *C. opilio*. Half of this estimate, 225 million pounds (102,000 mt), is available from the area north of 58° N. latitude, where large *C. bairdi* occur only rarely (Figure F3).

F.4.7.2. Equilibrium Yield (EY)

A lack of data on the effects of harvest on the populations of *C. bairdi* and *C. opilio* in the Bering Sea precludes any estimate of EY at the present.

F.4.7.3. Acceptable Biological Catch (ABC)

In the absence of modifying data ABC is taken to be equal to MSY for *C. bairdi* (89,000,000 pounds—40,381 mt) and *C. opilio* (448,000,000 pounds—203,000 mt) in the eastern Bering Sea.

F.4.8. ESTIMATE OF FUTURE STOCK CONDITION

Available data indicates that the Tanner crab stock in the Bering Sea should be capable of sustaining current levels of harvest through the 1978 season.

F.5.0 CATCH AND CAPACITY DESCRIPTORS

F.5.1. DATA AND ANALYTICAL APPROACHES

F.5.1.1. Domestic

Data on domestic harvest capcity is found in Table 6 and Table 11.

F.5.1.2. Foreign

Foreign capacity is presently limited by quota allocations and vessel permit limitations.

F.5.2. DOMESTIC ANNUAL CAPACITY (DAC)

See Table 6.

F.5.3. EXPECTED DOMESTIC ANNUAL HARVEST (DAH)

The DAH for *C. bairdi* in the eastern Bering Sea is expected to reach the OY of 89 million pounds (40,381 mt). U.S. harvests have increased approximately eight fold—from 1975-77.

Expected annual domestic harvest of *C. opilio* north of 58° N. latitude will be minimal, though it is expected market demand may increase the catch south of that line to near the estimate of 22 million pounds (10,000 mt) (Table 11, p. 76).

F.6.0 OPTIMUM YIELD

F.6.1. DEPARTURE FROM MSY TO ABC FOR BIOLOGICAL REASONS

In the absence of modifying data, ABC is taken to be equal to MSY for *C. bairdi* and *C. opilio* in the Bering Sea.

F.6.2. OPTIMUM YIELD

Optimum yields for *C. bairdi* and *C. opilio* have been determined taking into consideration the following socio-economic factors:

a. United States policy, through a series of bilateral agreements over the past several years, has been directed at improving the conditions for developing the U.S. Tanner crab industry. As a result of these agreements, foreign nations have been prevented from Tanner crab fishing in the Gulf of Alaska and have either reduced their take of Tanner crab in the eastern Bering Sea or withdrawn from the fishery altogether. The policy has accommodated a favorable investment climate for a growing U.S. catching, procesing, and marketing capacity.

b. The U.S. markets for Tanner crab are in an early stage of development with exports accounting for a substantial portion of U.S. production. Industry representatives have repeatedly drawn attention to the volatility of markets for shellfish and repeatedly stated that increases in foreign allocations of tanner crab will weaken U.S. domestic and export markets. Not enough is currently known about the elasticities of the markets for crabs of various species, the degree of overlap between species, frozen products as opposed to canned, and the affect of fluctuating supplies on world markets to accurately define the precise level at which foreign allocations will adversely impact the U.S. fishing industry. Testimony and evidence on these questions that was considered in arriving at OY and TALFF figures is summarized in Appendix 11.6.

c. The domestic market for Tanner crab has discouraged the delivery of crab less than 5 inches in carapace width. In 1976, a minimum carapace size limit of 5.5 inches was imposed on the domestic Tanner crab fishery in the eastern Bering Sea for *C. bairdi* only. Since only a small portion of the *C. opilio* population exceeds domestic industry size requirements, the U.S. fishery for Tanner crab is therefore primarily for *C. bairdi*.

d. The tanner crab fishery is conducted by heavily capitalized vessels originally constructed for the offshore king crab fishery. Public testimony has revealed that the catch per unit effort (CPUE) must be held fairly high, dependent on price structure, to enable U.S. fishermen to engage in the fishery. The U.S. CPUE in the eastern Bering Sea in 1976 was 63 crab per pot. This criterion would suggest that populations must be maintained at near present abundance to produce an economically acceptable catch per unit effort for U.S. fishermen. Since *C. bairdi* Tanner crab are dispersed over a broad geographic area in the eastern Bering Sea, density levels throughout much of this area are (probably) below that which can be

profitably harvested. Therefore, setting OY at ABC may be optimistic from the standpoint of actually being able to recover that full amount from the stock under the economic parameters within which all commercial fishermen work.

Given the restrictions on the foreign fleet, the availability of the resource south of 58° N latitude, and the intent, desire and capacity of the domestic fleet to develop a fishery on *C. opilio* crab, the harvest which may be realized by the domestic fleet during the 1977/78 season, south of 58° N latitude in the Bering Sea, is expected to be as high as 10,000 Mt (22,000,000 lbs), well within the limits of the acceptable biological catch. Although there is a surplus of *C. opilio* south of 58° N latitude over DAH, allocation to a foreign nation would unavoidably damage the stocks of *C. bairdi*, all of which are expected to be taken by U.S. fishermen.

e. Rational management concerns other than MSY must be taken into consideration in specifying optimum yield. Stability of the fishery should be ensured by maintaining a stock base of various age classes of marketable crab, rather than creating an industry of dependency on a single year class resource. By maintaining a fishery on a broad age group, the variations associated with strong and weak year classes would be reduced.

f. The ecological importance of Tanner crab stocks is not well understood. The rich eastern Bering Sea is inhabited by the largest concentration of sea birds and marine mammals in the world. Millions of seals, important populations of whales, sea otters and other marine mammals, as well as hundred of million of sea birds and other forms of marine life are currently being impacted by the annual removal of more than 5 billion pounds (2,268,600 mt) from the eastern Bering Sea biomass. Optimum yield considerations indicate a cautious approach to additional removals.

Optimum yield for Tanner crab for 1978 are prescribed as follows:

C. bairdi, 89 million pounds (40,381 mt).
C. opilio:
North of 58°, 36.06–38.06 million pounds (16,360–17,268 mt).
South of 58°, 22 million pounds (10,000 mt).

F.7.0 Total Allowable Level of Foreign Fishery

The North Pacific Fisheries Council has determined that the U.S. domestic Tanner crab fishing fleet has the intent, desire, and capacity to fully harvest the OY of *C. bairdi* crab in the eastern Bering Sea. NMFS and OCS surveys show that the vast majority, all but about two percent (2 percent), of the *C. bairdi* stocks are found below 58° N latitude (Fig. F3, page 250). For this reason, and in order to prevent gear conflicts and a foreign by-catch of *C. bairdi* crab, any foreign harvest of Tanner crab has been restricted to the area north of 58° N latitude and west of 164° W longitude.

Approximately half of the *C. opilio* crab stocks found in the eastern Bering Sea are located south of 58° N latitude and have a similar and overlapping distribution with *C. bairdi* (Fig. F3, Page 250). The U.S. Tanner crab fleet has expressed a relatively strong interest in the development of a directed *C. opilio* crab fishery, however, the rate at which this fishery might develop can not be projected at this time with any degree of accuracy. Development of a directed domestic *C. opilio* fishery is considered to be both desirable and beneficial should market conditions and technological advancements make it feasible for domestic fishermen to economically harvest this resource.

About half of the *C. opilio* population would be available north of 58° N latitude for an ABC of approximately 225,000,000 pounds (102,000 mt). Testimony received during the development of this plan and the available evidence[1] indicates that TALFF exceeding 33,000,000 lbs (15,000 mt) will have an adverse effect on the developing U.S. Tanner crab fishery. Though 2,500 mt more than the TALFF set by the PMP for 1977 it is felt the increase is permissible in light of world market conditions and the fact that it will contain a smaller amount of the more desirable *C. bairdi* species than has been taken by foreign nations in the past. Therefore, the TALFF is equal to the OY minus the expected domestic annual catch. (TALFF=33,000,000 pounds, 15,000 mt)

F.8.0 Management Regime

F.8.1. Management Objectives

See statewide section 8.1. The management plan for the Bering Sea seeks to encourage the development of the U.S. fishery in this area by:

1. Ensuring concentrations of crab capable of supporting CPUE levels necessary to support U.S. fishery development are reserved for U.S. fishermen.

2. Preventing gear conflicts between U.S. and foreign fishermen.

3. Reserving crab for the U.S. fishery above the minimum size required by the U.S. industry for market development.

F.8.2. Areas, Fisheries and Stocks Involved

Refer to section 3.1.

F.8.3. Management Measures and Rationale

F.8.3.1. Domestic

See statewide section 8.3.1.

F.8.3.2. Foreign

See statewide section 8.3.2. Regulations governing foreign fishing in the Federal Register of February 11, 1977 part IV, relative to Tanner crab are retained unchanged except:

1. Subpart G, 611.90, crabs, section (b) Area quotas is changed to read: "No more than 15,000 mt of snow (Tanner) crab may be taken by foreign fishing vessels from that portion of the Bering Sea area over which the United States exercises fishing jurisdiction."

2. Eliminate categories i and ii from the above Section.

3. Section (d)(2) is changed to read: "It shall be unlawful for any foreign fishing vessel to fish for crab at any time east of 164° W. longitude and south of 58°00' N. latitude in the Bering Sea, throughout the Northeastern Pacific Ocean and within 12 miles of the baselines used to measure the U.S. Territorial Sea.

4. Section (F)(2) is changed by eliminating the reference to reporting by area.

F.8.3.3. Relationship of the Recommended Measures to Existing Applicable Laws and Policies

See statewide section 8.3.3.

[1] A summary of testimony and evidence considered to arrive at an FAC of 15,000 MT is contained in Appendix 11.6.

F.8.4. Enforcement Requirements

See statewide section 8.4.

F.8.5. Reporting Requirements

See statewide section 8.5.

F.8.6. Cooperative Research Requirements

See statewide section 8.6.

F.8.7. Permit Requirements

See statewide section 8.7. for domestic licensing and foreign permits required.

F.8.8. Financing Requirements

See statewide section 8.8.

9.0 Statement of Council Intentions to Review this Plan After Approval by the Secretary

The North Pacific Fishery Management Council will, after approval and implementation of this plan by the Secretary, maintain a continuing review of the fisheries managed under this plan by the following methods:

1. Maintain close liaison with the management agencies involved, usually the Alaska Department of Fish and Game and the National Marine Fisheries Service, to monitor the development of the fisheries and the activity in the fisheries.

2. Promote research to increase their knowledge of the fishery and the resource, either through Council funding or by recommending research projects to other agencies.

3. Conduct public hearings at appropriate times and in appropriate locations, usually at the close of a fishing season and in those areas where the fishery is concentrated, to hear testimony on the effectiveness of the management plans and requests for changes.

4. Consideration of all of the information gained from the first three activities and development, if necessary, of amendments to the management plan. Hold public hearings on the amendments prior to sending them to the Secretary for adoption.

410.0 References

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